

***USFS Northern Region
Songbird Monitoring Program***

***Distribution and
Habitat Relationships***



USFS contract #R1-95-05, Second Report

6 November 1995

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NORTHERN REGION LANDBIRD MONITORING PROGRAM

USFS Region 1 contract #57-0343-5-00012
Second Report

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Executive Summary

Overview. This report includes a series of first-generation habitat-relationships models for a variety of songbird species that were detected on point counts conducted in association with the Northern Region Migratory Songbird Monitoring Program (under support from an earlier USFS contract, #53-0343-2-00207). The models include information on probabilities of occurrence within each of a series of major cover types. Models were built under the working assumption that probabilities of occurrence are constant within patches of a given cover type, regardless of the landscape context. Second-generation models, which will include refinements based on additional local- and landscape-level variables are forthcoming.

Summary of principal results. Based on a single year's field effort across all 13 forests, we detected a total of 186 bird species, including 14 waterfowl species, 19 raptor species, 8 shorebird species, and 8 game bird species (Table 1). Most of the species (137) included those that the point count method was designed to detect--songbirds (loosely defined as doves through sparrows). I have attached information on the geographic and habitat distribution patterns for most (108) of the songbird species; it should be clear that the detail and region-specific nature of this information can be matched by no other database in existence. **None of the species herein are threatened or endangered; thus, there is a chance to use the information in a proactive manner to avoid future wildlife conflicts that might result from land-use decisions.** Some results from this initial analysis can already provide clear guidance for land-use decisions that involve input from wildlife biologists. Other results merely suggest potential problems that may be festering, and that are worthy of additional attention.

Specifically, a number of bird species are restricted in their habitat distribution to each of the following: (1) post-fire, standing-dead forests, (2) relatively uncut, older forests, (3) marshes, (4) riparian bottomlands, (5) upland riparian stream environments, and (6) grassland and/or sagebrush. Simply put, the loss any one of these cover types will mean the loss of those bird species that are relatively restricted to it. Thus, the question becomes one of how much of each to maintain on the landscape. A second question involves whether the bird species can tolerate highly managed forms of each type. Bird species restricted to the first three types can probably withstand much less disturbance than bird species restricted to the latter three types. Another series of bird species occurs commonly in agricultural fields, prompting the question of whether farming activities are compatible with nesting success. Still another set of species occurs commonly in harvested conifer forests, which is of management interest because the harvested forests are "unnatural" in the sense that details of their structure (e.g., widely, or evenly-spaced live trees) do not exist under natural conditions. This is a potential problem because unnatural cover types may elicit settling responses by species that are "programmed" to respond to a superficially similar, but fundamentally different, cover type. Thus, it becomes imperative that we determine whether these unnatural cover types are acting as "ecological traps", where species are being attracted to sites where suitability (in terms of reproductive success and or adult survival) is poor because food resources, predation, or parasitism rates are unnaturally high.

Notes on Methods

Combining cover types. Our original Northern Rocky Mountain cover type descriptions included 241 possible types (see the Field Methods handbook submitted as part of the final report under contract #53-0343-2-00207). For the purposes of this report, these were combined into 18 types, and most of the combinations involved data from the various post-harvest treatments. Specifically, data from each of four harvest treatments (clearcuts, seed-tree cuts, shelterwood cuts, and group-selection cuts) and post-fire conditions were combined across forest types into five "disturbance" categories. Within each of these five disturbance categories, I also combined all four temporal stages of post-harvest development from the early, low-shrub stage to the later, tall-shrub stage. Finally, the "young", "mature", and "old-growth" stages under each forest type were combined into a single (relatively undisturbed) category for each forest type. Thus, for conifer forest types, we ended up with 11 categories represented by six relatively mature and closed-canopy forest types (ponderosa pine through spruce-fir forests) and five early-successional or post-treatment types (post-fire, clearcut, seed-tree cut, shelterwood cut, and group-selection cut).

A review of cover type descriptions. Each of the condensed cover types has one or more photographs associated with descriptions provided in the Northern Rocky Mountain Cover Type Manual (which was also submitted as part of the final report under contract #53-0343-2-00207). Nonetheless, I provide a brief description of each below:

Residential--this type includes both urban and rural residential areas. The key here is that the sample point falls within an area that contains man-made structures, open spaces resulting from forest clearing, and (generally) non-native vegetation.

Agricultural land--this type includes both irrigated and dry cropland. The key here is that the vegetation represents a monoculture in comparison with a native grassland.

Grassland--this includes short-, mid-, and tall-grass prairie types. We further subdivided this type into relatively heavily grazed and relatively ungrazed, but the grazing intensities were subsequently not distinguished because observers from eastern Montana and North Dakota failed to record that distinction in 1994.

Sagebrush--this type is dominated by its namesake, although native grasses and junipers may have been present. It includes both heavily grazed and relatively ungrazed subgroups.

Ponderosa pine--at least 80% of the canopy cover in this type was comprised of its namesake, and it included young, mature, and old-growth stages. The more mature stages may have been selectively logged, but the canopy was still relatively closed (in comparison with the harvested types described below).

Douglas-fir--at least 80% of the canopy cover in this type was comprised of its namesake, and it included young, mature, and old-growth stages. The more mature stages may have been selectively logged, but the canopy was still relatively closed (in comparison with the harvested types described below).

Mixed-conifer--except for a few points that fell within fairly pure larch forest, no single conifer species made up more than 80% of the canopy cover in this forest type. As with the preceding two types, this category included young, mature, and old-growth stages. The more mature stages may have been selectively logged, but the canopy was still relatively closed (in comparison with the harvested types described below).

Cedar-hemlock--at least 80% of the canopy cover in this type was comprised of the combination of cedar, hemlock, and/or grand fir, and it included young, mature, and old-growth stages. The more mature stages may have been selectively logged, but the canopy was still relatively closed (in comparison with the harvested types described below).

Lodgepole--at least 80% of the canopy cover in this type was comprised of its namesake, and it included young, mature, and old-growth stages. The more mature stages may have been selectively logged, but the canopy was still relatively closed (in comparison with the harvested types described below).

Spruce-fir--at least 80% of the canopy cover in this type was comprised of a combination of spruce and fir species or high-elevation whitebark/limber pine. The type includes forests in young, mature, and old-growth stages. The more mature stages may have been selectively logged, but the canopy was still relatively closed (in comparison with the harvested types described below).

Group selection--this type includes forest stands wherein clusters of trees were removed, leaving the appearance of clusters of trees with large open-spaces in between. Physiognomically, this type includes stands in the earliest post-harvest successional stage (with shrub and seedling development still below 1 meter in height) up to the pole-sapling stage (with trees up to about 10-cm dbh). A relatively small proportion (< 5%) of this type was comprised of what were fairly pure stands of one of the conifer species designated above; most of the pre-treatment stands were mixed-conifer stands.

Shelterwood--this type includes forest stands within which a relatively large percentage (perhaps 80%) of trees had been removed so that a series of uniformly-spaced, large trees were left to provide shade for regenerating seedlings. These stands take on an orchard-like appearance because of the uniform spacing of overstory trees, and are in an early to mid-succession post-harvest stage of stand development.

Seed tree--this type includes forest stands wherein most trees were removed and a few widely spaced (generally fairly mature) trees were left to act as a seed source.

Clearcut--this type includes forest stands within which nearly all trees have been removed; only snags or a smattering of (generally small) trees remain. This type is similar to the post-fire category except that there are numerous standing dead trees in the "natural" post-fire situation.

Post-fire--this type was comprised of forest stands that had experienced a relatively intense stand-replacement crown fire, as evidenced by the presence of numerous blackened, standing-dead trees. I included data from my 1989-1990 post-fire studies.

Marsh, wetland--this riparian type includes areas with standing water that supported either short-statured marsh or meadow vegetation, or willow flats.

Riparian shrub--this type includes areas that have a well developed but narrow riparian vegetation component (e.g., alder, maple, willow) along relatively fast-moving streams.

Riparian bottomland/aspen--this riparian type includes aspen stands and streamside areas that generally contain an abundant cottonwood canopy cover. Points from hardwood draws in eastern Montana and North Dakota were included in this type as well.

Model building protocol. The process of building a habitat distribution model for a given species included the following steps: (1) I looked at its distribution across the Region to see if the species was restricted to a subset of the entire area. If so, I looked at whether the resulting pattern of habitat use was strongly biased by the inclusion of points from outside the normal range of the species. No obvious problems emerged; (2) I looked at the influence of time-of-day on detection probability and excluded data from time period extremes if the detection probabilities were exceptionally high or low; (3) I did the same as in number 2 for time-of-season; (4) For the non-riparian cover types, I excluded points that were positioned within 100 m from the edge of another major cover type. That way, I excluded points where at least some of the birds were certainly detected in a cover type that was other than that recorded as present at the census point. I had to include data from **all** points positioned within each of the three riparian types (marsh, riparian shrub, and riparian bottomland) because most of those points were within 100 m of another cover type--those cover types are less expansive, edge types by definition. Thus, the number of points used to calculate the probabilities of occurrence across cover types (4200) was substantially less than the number actually conducted in the field (9091).

Even if the cover type was homogeneous within a 100-m radius around the observer, some birds were still detected more than 100 m away, and they could have been in cover types that differed from the single cover type recorded at a given census point. To "purify" the samples even further, I could have eliminated all bird detections beyond, say, 30 m, but as a compromise between knowing that bird detections came from within the cover type of interest and having as large a sample size as possible, I used detections that occurred within 100 m of the observer. Thus, probabilities of occurrence are associated with relatively homogeneous areas.

Which species are included in the modeling effort? Several published studies suggest that a species should be detected on about 50 point counts before initiating a model-building effort, and 98 species met that criterion. I have appended models for each of those species plus 10 additional species that did not meet the sample size criterion, but that illustrate potential management issues nonetheless.

Summary of principal results.

1. Based on a single year's field effort across all 13 forests, the monitoring program has produced a wealth of knowledge about the geographic and habitat distribution of an amazing number of bird species. We detected a total of 186 bird species, 137 of which were species that the point count method was designed to detect--songbirds (loosely defined as doves through sparrows). We also detected 14 waterfowl species, 19 raptor species, 8 shorebird species, and 8 game bird species (Table 1). Geographic and habitat distribution patterns for most (108) of the 137 songbird species are included in this report.
2. The detail and region-specific nature of this information can be matched by no other database in existence. Yes, some patterns of habitat use were already common knowledge (e.g., Grasshopper Sparrow is restricted to grasslands, or Brewer's Sparrow is restricted to sagebrush), but other patterns of restricted distribution were not as evident prior to this work (e.g., Black-backed Woodpecker to burned forests, or Brown Creeper to relatively uncut cedar-hemlock forests). More importantly, prior to this survey, we had no knowledge of the relative abundance of the more widespread species across cover types, especially harvested forest types. It is now evident that Orange-crowned Warbler and Solitary Vireo, for example, occur not only broadly across forest types, but most commonly in harvested forest types, and that Williamson's Sapsucker is even relatively restricted to such types! This kind of information is available nowhere else.
3. Results from this report can already provide clear guidance for land-use decisions that involve input from wildlife biologists. For example, a number of bird species are relatively restricted in their habitat distribution to each of the following (species that best illustrate a given distribution pattern are highlighted in **bold** lettering): (a) post-fire, standing-dead forests, (e.g., **Black-backed Woodpecker**, Cassin's Finch, Clark's Nutcracker, Hairy Woodpecker, House Wren, Lincoln's Sparrow, Mountain Bluebird, Olive-sided Flycatcher, Pine Siskin, Ruby-crowned Kinglet, Tree Swallow, Three-toed Woodpecker, Western Wood-Pewee); (b) relatively uncut, older forests (e.g., **Brown Creeper**, Chestnut-backed Chickadee, Golden-crowned Kinglet, Gray Jay, Hammond's Flycatcher, Hermit Thrush, Mountain Chickadee, Pine Grosbeak, Pileated Woodpecker, Red-breasted Nuthatch, Townsend's Warbler, Varied Thrush, Winter Wren); (c) marshes (e.g., Common Snipe, **Common Yellowthroat**, [Marsh Wren], Red-winged Blackbird, [Yellow-headed Blackbird]); (d) riparian bottomlands (e.g., American Goldfinch, American Redstart, Belted Kingfisher, Black-capped Chickadee, [Bank Swallow], Cedar Waxwing, Gray Catbird, Lazuli Bunting, **Least Flycatcher**, Northern Waterthrush, Ovenbird, Red-eyed Vireo,

Song Sparrow, Tree Swallow, Veery, Western Wood-Pewee, Willow Flycatcher, Yellow-breasted Chat, Yellow Warbler); (e) upland riparian stream environments (e.g., **American Dipper**, Lincoln's Sparrow, Wilson's Warbler); (f) grassland and/or sagebrush (e.g., Baird's Sparrow, Brewer's Sparrow, Chestnut-collared Longspur, Clay-colored Sparrow, Common Nighthawk, Field Sparrow, Grasshopper Sparrow, Horned Lark, Lark Sparrow, **Sprague's Pipit**, Vesper Sparrow, Western Meadowlark); and (g) agricultural fields (e.g., **Bobolink**, Savannah Sparrow, Vesper Sparrow, Western Meadowlark). Obviously, the loss any one of these cover types will mean the loss of those bird species that are relatively restricted to it. Thus, it's clear that we need to maintain each of those elements on the broader landscape, although it's unclear how much of each needs to be retained to maintain viable populations.

4. Even if we are not about to lose a given cover type from the broader landscape, land use practices within and around that type may have important implications, especially for species restricted to that cover type. For example,

a) **Bird species relatively restricted to early post-fire situations.**--salvage logging will have a negative impact on species that are either restricted to, or relatively restricted to, early post-fire conditions. Such distribution patterns result from the fact that those wildlife species depend to a great extent on standing dead trees in burned forests for feeding and/or nesting purposes. The presence of such narrowly distributed habitat specialists leaves little doubt that post-fire salvage cutting activities are in direct conflict with the needs of these bird species.

b) **Bird species restricted to relatively uncut, older forests.**--Based on observed distribution patterns, the cutting (even light thinning) of dense, older forests (especially the cedar-hemlock type) will have negative effects on several species that are restricted to those conditions. To assure the maintenance of their populations, we probably need to maintain relatively large patches of older forest types on the landscape.

c) **Bird species restricted to marshlands.**--The draining and conversion of wetlands will have negative effects on species restricted to those conditions. Because our methods were not well designed to survey birds that occupy this cover type, we did not detect additional species that are known to fall into this category.

d) **Bird species restricted to riparian bottomlands.**--Numerous songbird species are relatively restricted to riparian bottomlands. This fact takes on special meaning when we consider that bottomland riparian cover types make up less than 0.5% of all land area, and that they incur a disproportionate amount of human activity (i.e., home building, recreation, and livestock grazing) and cowbird activity. Much of this land base is private, making publicly-owned land of this type much more important as refuges for wildlife that might be sensitive to the human activities outlined above. We currently lack, but desperately need, information on cowbird parasitism rates in relation to the presence of livestock in riparian bottomlands, and we need information on the effects of vegetation

alteration and livestock presence on nesting success of our riparian bottomland birds.

e) **Bird species restricted to upland riparian stream environments.**--These species may be especially sensitive to so-called "best management practices", which have never been evaluated in terms of their effects on a wide variety of riparian-dependent terrestrial wildlife species.

f) **Birds restricted to grassland and sagebrush environments.**--If we couple the fact that many species are restricted to grassland, sagebrush, or a combination of both, with the fact that many of the same species are declining on a nation-wide scale, the management of those lands becomes an issue. We cannot comment on the effects of grazing until the 1995 data have been incorporated into the database, but this is a common land-use activity on grassland and shrubsteppe environments that may be incompatible with the needs of some of these bird species.

g) **Birds that occur commonly in agricultural fields.**--Several species occur commonly in (and in some cases are nearly restricted to) agricultural fields during the breeding season. The main issue here is one of whether mechanical disturbance from farm machinery interferes with the reproductive biology of these species. If so, these environments may be acting as "ecological traps" that attract the species, but don't allow them to be successful there.

5. Most conifer-forest birds are distributed broadly across forest types, and many occur relatively commonly in variously cut forests (e.g., American Kestrel, Black-headed Grosbeak, Chipping Sparrow, Dusky Flycatcher, Hairy Woodpecker, House Wren, MacGillivray's Warbler, Mountain Bluebird, Northern Flicker, Orange-crowned Warbler, Rufous Hummingbird, Steller's Jay, Swainson's Thrush, Townsend's Solitaire, Warbling Vireo, Western Tanager, **Williamson's Sapsucker**, Yellow-rumped Warbler). This probably means that, except for those species restricted to older, relatively uncut forests, we can modify forest lands to an extent and still retain conditions necessary for most forest birds. The potential management issue that still looms is related to the fact that harvested forests are "unnatural" in the sense that their structure consists of combinations of elements (widely, or evenly-spaced live trees) that simply do not exist in natural successional seres. The problem is that these unnatural cover types may elicit settling responses by species that are "programmed" to respond to superficially similar, but fundamentally different, early successional forest types. Thus, it becomes imperative that we determine whether these unnatural forest types are acting as "**ecological traps**", where species are being attracted to areas where suitability (in terms of reproductive success and or adult survival) is poor because food resources, predation, or parasitism rates are unnaturally high there. Because no forest bird species is **restricted** to harvested conditions, there will always be a "backup" of lightly harvested or unharvested forest as a refuge from such a potential problem, should it exist. Although we need data on nest success to be sure, I suspect that most bird species do well in harvested forests. Moreover, if our abundance data reflect suitability of cover types, we have improved conditions for most forest bird species through timber harvesting activities.

Who can answer questions you may have? I am available through regular mail (given on p. 1), e-mail (given on p. 1), and the phone (use 406-243-4292 to leave a message).

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Table 1. Measures of abundance for each of the bird species detected on point counts conducted in the Northern Region.

| Species | No. points | Percent | No. individs | Mean #/point |
|------------------------|---------------|---------|-----------------|-----------------|
| No. point counts | 9091 | 100.00 | | |
| Dark-eyed Junco | 4434 | 48.77 | 7486 | .823 |
| Yellow-rumped Warbler | 3290 | 36.19 | 4451 | .490 |
| Red-breasted Nuthatch | 3268 | 35.95 | 4559 | .501 |
| Pine Siskin | 2908 | 31.99 | 6701 | .737 |
| Chipping Sparrow | 2852 | 31.37 | 4375 | .481 |
| American Robin | 2802 | 30.82 | 4097 | .451 |
| Swainson's Thrush | 2796 | 30.76 | 4580 | .504 |
| Western Tanager | 2392 | 26.31 | 3051 | .336 |
| Ruby-crowned Kinglet | 2312 | 25.43 | 3270 | .360 |
| MacGillivray's Warbler | 2108 | 23.19 | 2824 | .311 |
| Townsend's Warbler | 1948 | 21.43 | 2999 | .330 |
| Warbling Vireo | 1692 | 18.61 | 2298 | .253 |
| Mountain Chickadee | 1648 | 18.13 | 2320 | .255 |
| Northern Flicker | 1347 | 14.82 | 1563 | .172 |
| Golden-crowned Kinglet | 1235 | 13.58 | 1824 | .201 |
| Dusky Flycatcher | 1179 | 12.97 | 1521 | .167 |
| Brown-headed Cowbird | 1124 | 12.36 | 1691 | .186 |
| Red Crossbill | 1087 | 11.96 | 4676 | .514 |
| Solitary Vireo | 1036 | 11.40 | 1162 | .128 |
| Western Meadowlark | 1005 | 11.05 | 2494 | .274 |
| Townsend's Solitaire | 1003 | 11.03 | 1163 | .128 |
| Vesper Sparrow | 999 | 10.99 | 2012 | .221 |
| Varied Thrush | 931 | 10.24 | 1206 | .133 |
| Common Raven | 927 | 10.20 | 1143 | .126 |
| Hammond's Flycatcher | 711 | 7.82 | 866 | .095 |
| Orange-crowned Warbler | 705 | 7.75 | 839 | .092 |
| Rufous-sided Towhee | 607 | 6.68 | 1090 | .120 |
| Winter Wren | 582 | 6.40 | 661 | .073 |
| Clark's Nutcracker | 581 | 6.39 | 859 | .094 |
| Mountain Bluebird | 573 | 6.30 | 894 | .098 |
| Olive-sided Flycatcher | 559 | 6.15 | 615 | .068 |
| Gray Jay | 546 | 6.01 | 800 | .088 |
| Yellow Warbler | 534 | 5.87 | 707 | .078 |
| Song Sparrow | 531 | 5.84 | 716 | .079 |
| House Wren | 530 | 5.83 | 693 | .076 |
| Field Sparrow | 482 | 5.30 | 763 | .084 |
| Red-naped Sapsucker | 469 | 5.16 | 539 | .059 |
| Evening Grosbeak | 456 | 5.02 | 1233 | .136 |
| Hermit Thrush | 449 | 4.94 | 565 | .062 |
| Lazuli Bunting | 449 | 4.94 | 617 | .068 |
| Black-capped Chickadee | 447 | 4.92 | 630 | .069 |

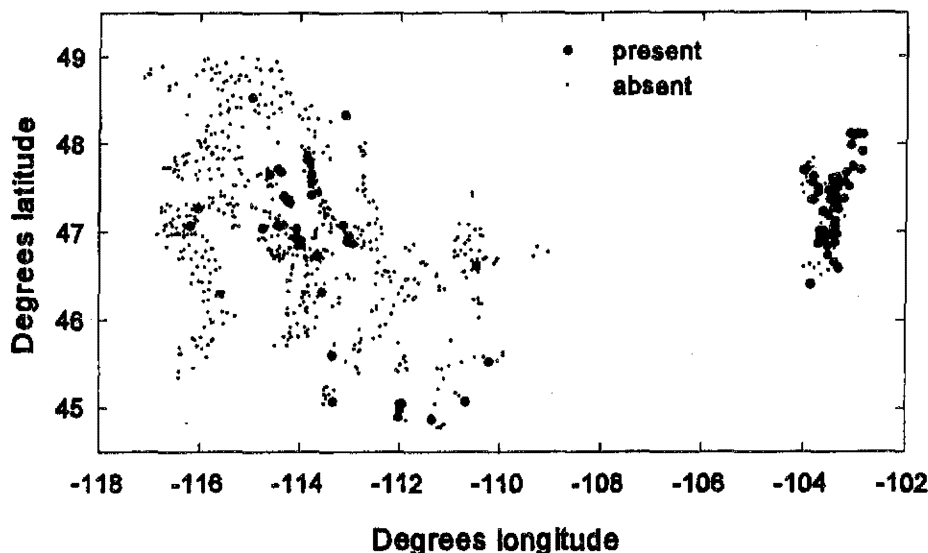
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|---------------------------|-----|------|-----|------|
| Cassin's Finch | 405 | 4.45 | 557 | .061 |
| Hairy Woodpecker | 394 | 4.33 | 454 | .050 |
| Mourning Dove | 390 | 4.29 | 540 | .059 |
| Grasshopper Sparrow | 322 | 3.54 | 544 | .060 |
| Pileated Woodpecker | 320 | 3.52 | 336 | .037 |
| Fox Sparrow | 309 | 3.40 | 398 | .044 |
| Horned Lark | 291 | 3.20 | 572 | .063 |
| Steller's Jay | 283 | 3.11 | 355 | .039 |
| White-crowned Sparrow | 263 | 2.89 | 380 | .042 |
| Chestnut-backed Chickadee | 259 | 2.85 | 552 | .061 |
| American Crow | 246 | 2.71 | 415 | .046 |
| Common Yellowthroat | 245 | 2.69 | 335 | .037 |
| Tree Swallow | 239 | 2.63 | 531 | .058 |
| Ruffed Grouse | 235 | 2.58 | 239 | .026 |
| Red-tailed Hawk | 234 | 2.57 | 263 | .029 |
| Wilson's Warbler | 234 | 2.57 | 301 | .033 |
| Black-headed Grosbeak | 228 | 2.51 | 246 | .027 |
| Western Wood-Pewee | 217 | 2.39 | 255 | .028 |
| Northern Waterthrush | 200 | 2.20 | 242 | .027 |
| Red-winged Blackbird | 178 | 1.96 | 451 | .050 |
| Willow Flycatcher | 176 | 1.94 | 229 | .025 |
| Lark Sparrow | 175 | 1.92 | 315 | .035 |
| Rufous Hummingbird | 167 | 1.84 | 200 | .022 |
| Cedar Waxwing | 160 | 1.76 | 331 | .036 |
| American Redstart | 158 | 1.74 | 184 | .020 |
| Savannah Sparrow | 158 | 1.74 | 311 | .034 |
| Lincoln's Sparrow | 157 | 1.73 | 209 | .023 |
| European Starling | 153 | 1.68 | 780 | .086 |
| Brewer's Blackbird | 146 | 1.61 | 375 | .041 |
| Yellow-breasted Chat | 139 | 1.53 | 154 | .017 |
| Eastern Kingbird | 133 | 1.46 | 197 | .022 |
| Nashville Warbler | 131 | 1.44 | 145 | .016 |
| Common Snipe | 126 | 1.39 | 163 | .018 |
| Sprague's Pipit | 121 | 1.33 | 160 | .018 |
| Rock Wren | 120 | 1.32 | 149 | .016 |
| American Kestrel | 115 | 1.26 | 126 | .014 |
| Calliope Hummingbird | 115 | 1.26 | 121 | .013 |
| Red-eyed Vireo | 111 | 1.22 | 126 | .014 |
| Three-Toed Woodpecker | 110 | 1.21 | 126 | .014 |
| Cordilleran Flycatcher | 108 | 1.19 | 130 | .014 |
| Black-billed Magpie | 104 | 1.14 | 158 | .017 |
| Brewer's Sparrow | 103 | 1.13 | 194 | .021 |
| American Goldfinch | 103 | 1.13 | 141 | .016 |
| Killdeer | 99 | 1.09 | 131 | .014 |
| Ring-necked Pheasant | 96 | 1.06 | 99 | .011 |
| Barn Swallow | 92 | 1.01 | 181 | .020 |
| Brown Creeper | 88 | .97 | 111 | .012 |
| Williamson's Sapsucker | 84 | .92 | 97 | .011 |
| Ovenbird | 80 | .88 | 100 | .011 |
| Green-tailed Towhee | 80 | .88 | 113 | .012 |
| Cliff Swallow | 71 | .78 | 456 | .050 |

| | | | | |
|----------------------------|----|-----|-----|------|
| Pine Grosbeak | 71 | .78 | 93 | .010 |
| White-breasted Nuthatch | 68 | .75 | 87 | .010 |
| House Finch | 63 | .69 | 186 | .020 |
| Clay-colored Sparrow | 54 | .59 | 65 | .007 |
| Belted Kingfisher | 53 | .58 | 56 | .006 |
| Downy Woodpecker | 51 | .56 | 52 | .006 |
| Baird's Sparrow | 50 | .55 | 70 | .008 |
| Common Nighthawk | 48 | .53 | 58 | .006 |
| Upland Sandpiper | 45 | .49 | 48 | .005 |
| Gray Catbird | 45 | .49 | 51 | .006 |
| Vaux's Swift | 41 | .45 | 89 | .010 |
| Black-backed Woodpecker | 39 | .43 | 44 | .005 |
| Lark Bunting | 38 | .42 | 91 | .010 |
| Sandhill Crane | 37 | .41 | 65 | .007 |
| Northern Harrier | 35 | .38 | 43 | .005 |
| House Sparrow | 35 | .38 | 79 | .009 |
| N. Rough-winged Swallow | 34 | .37 | 71 | .008 |
| Spotted Sandpiper | 33 | .36 | 38 | .004 |
| American Dipper | 32 | .35 | 37 | .004 |
| Great Blue Heron | 31 | .34 | 33 | .004 |
| Say's Phoebe | 31 | .34 | 34 | .004 |
| Violet-green Swallow | 30 | .33 | 52 | .006 |
| Osprey | 29 | .32 | 36 | .004 |
| Mallard | 28 | .31 | 60 | .007 |
| Brown Thrasher | 28 | .31 | 31 | .003 |
| Western Kingbird | 27 | .30 | 38 | .004 |
| Blue Grouse | 25 | .27 | 30 | .003 |
| Rock Dove | 25 | .27 | 85 | .009 |
| Bobolink | 25 | .27 | 38 | .004 |
| Northern Goshawk | 24 | .26 | 28 | .003 |
| Canada Goose | 23 | .25 | 143 | .016 |
| Veery | 22 | .24 | 25 | .003 |
| Sharp-shinned Hawk | 21 | .23 | 21 | .002 |
| Sharp-tailed Grouse | 21 | .23 | 55 | .006 |
| Least Flycatcher | 21 | .23 | 27 | .003 |
| Northern Oriole | 21 | .23 | 32 | .004 |
| Cooper's Hawk | 20 | .22 | 22 | .002 |
| Black-and-white Warbler | 20 | .22 | 20 | .002 |
| Turkey Vulture | 18 | .20 | 29 | .003 |
| Long-billed Curlew | 17 | .19 | 24 | .003 |
| Yellow-headed Blackbird | 15 | .16 | 50 | .005 |
| Wild Turkey | 14 | .15 | 24 | .003 |
| Chestnut-collared Longspur | 12 | .13 | 32 | .004 |
| Western Bluebird | 11 | .12 | 14 | .002 |
| Common Grackle | 11 | .12 | 30 | .003 |
| White-throated Swift | 10 | .11 | 25 | .003 |
| Swainson's Hawk | 9 | .10 | 10 | .001 |
| Lewis' Woodpecker | 9 | .10 | 9 | .001 |
| Common Merganser | 8 | .09 | 13 | .001 |
| Bank Swallow | 8 | .09 | 38 | .004 |
| American White Pelican | 7 | .08 | 79 | .009 |

| | | | | |
|---------------------------|---|-----|----|------|
| American Pipit | 7 | .08 | 13 | .001 |
| Spruce Grouse | 6 | .07 | 6 | .001 |
| Eastern Bluebird | 6 | .07 | 6 | .001 |
| White-winged Crossbill | 6 | .07 | 12 | .001 |
| Sora | 5 | .05 | 5 | .001 |
| Northern Pygmy-Owl | 5 | .05 | 5 | .001 |
| Barred Owl | 5 | .05 | 8 | .001 |
| Broad-tailed Hummingbird | 5 | .05 | 5 | .001 |
| Common Loon | 4 | .04 | 4 | .000 |
| Double-crested Cormorant | 4 | .04 | 6 | .001 |
| Barrow's Goldeneye | 4 | .04 | 7 | .001 |
| Golden Eagle | 4 | .04 | 5 | .001 |
| Great Horned Owl | 4 | .04 | 6 | .001 |
| Pygmy Nuthatch | 4 | .04 | 19 | .002 |
| Loggerhead Shrike | 4 | .04 | 6 | .001 |
| Wood Duck | 3 | .03 | 5 | .001 |
| American Wigeon | 3 | .03 | 6 | .001 |
| Bald Eagle | 3 | .03 | 3 | .000 |
| California Quail | 3 | .03 | 3 | .000 |
| Short-eared Owl | 3 | .03 | 3 | .000 |
| Black-chinned Hummingbird | 3 | .03 | 3 | .000 |
| Marsh Wren | 3 | .03 | 4 | .000 |
| Blue-winged Teal | 2 | .02 | 2 | .000 |
| Cinnamon Teal | 2 | .02 | 6 | .001 |
| Gadwall | 2 | .02 | 3 | .000 |
| Flammulated Owl | 2 | .02 | 2 | .000 |
| Red-headed Woodpecker | 2 | .02 | 2 | .000 |
| Boreal Chickadee | 2 | .02 | 3 | .000 |
| Canyon Wren | 2 | .02 | 2 | .000 |
| Northern Shoveler | 1 | .01 | 2 | .000 |
| Hooded Merganser | 1 | .01 | 1 | .000 |
| Prairie Falcon | 1 | .01 | 1 | .000 |
| Gray Partridge | 1 | .01 | 2 | .000 |
| Solitary Sandpiper | 1 | .01 | 1 | .000 |
| Burrowing Owl | 1 | .01 | 1 | .000 |
| Great Gray Owl | 1 | .01 | 2 | .000 |
| Northern Saw-whet Owl | 1 | .01 | 1 | .000 |
| Black Swift | 1 | .01 | 2 | .000 |
| Yellow-bellied Sapsucker | 1 | .01 | 1 | .000 |
| Sage Thrasher | 1 | .01 | 1 | .000 |
| Tennessee Warbler | 1 | .01 | 1 | .000 |
| Blackpoll Warbler | 1 | .01 | 1 | .000 |
| Mourning Warbler | 1 | .01 | 1 | .000 |

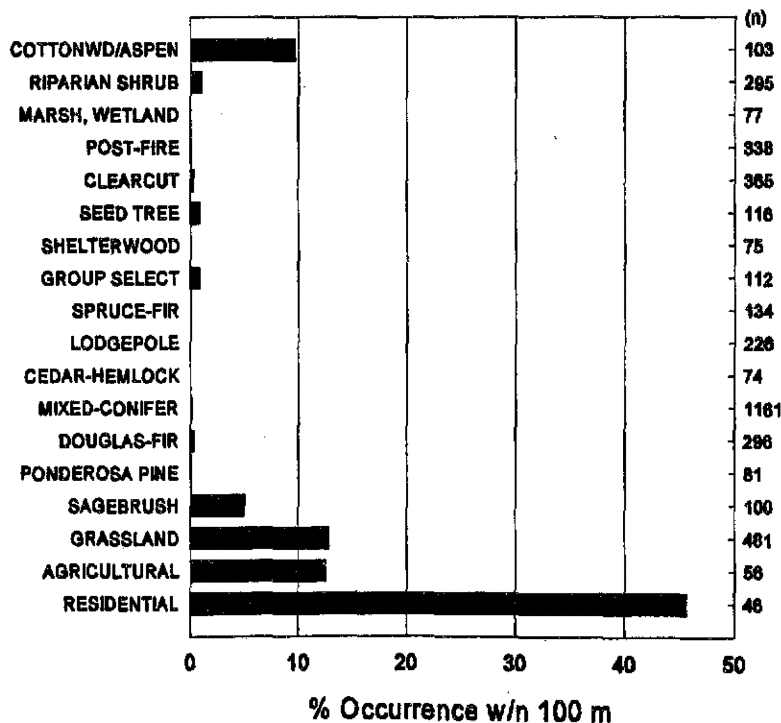
American Crow

Distribution and habitat use. American Crows are distributed throughout the region (see map at right) where they are restricted to the lower elevation non-forested cover types, most notably residential areas (see histogram below). Crows are 1.5 times more likely to occur on points with (18.2% occurrence) than without (11.2% occurrence) riparian vegetation near.



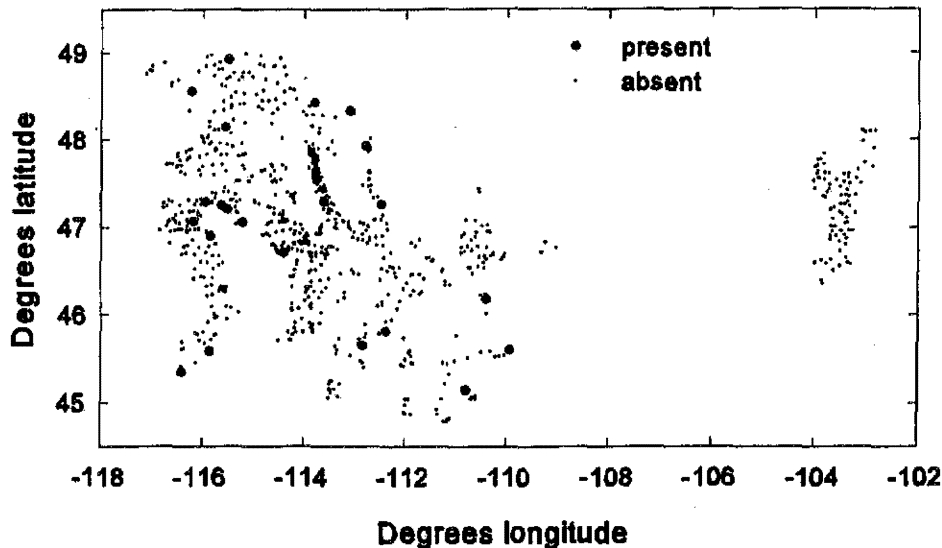
Management considerations.

The combination of agriculture and riparian bottomlands has undoubtedly benefitted crows tremendously. Because crows are effective egg predators, and because crow populations are probably abnormally high in bottomland forests, there may be negative effects on other bird species that use these areas for nesting (especially bird species that nest **only** in those areas).

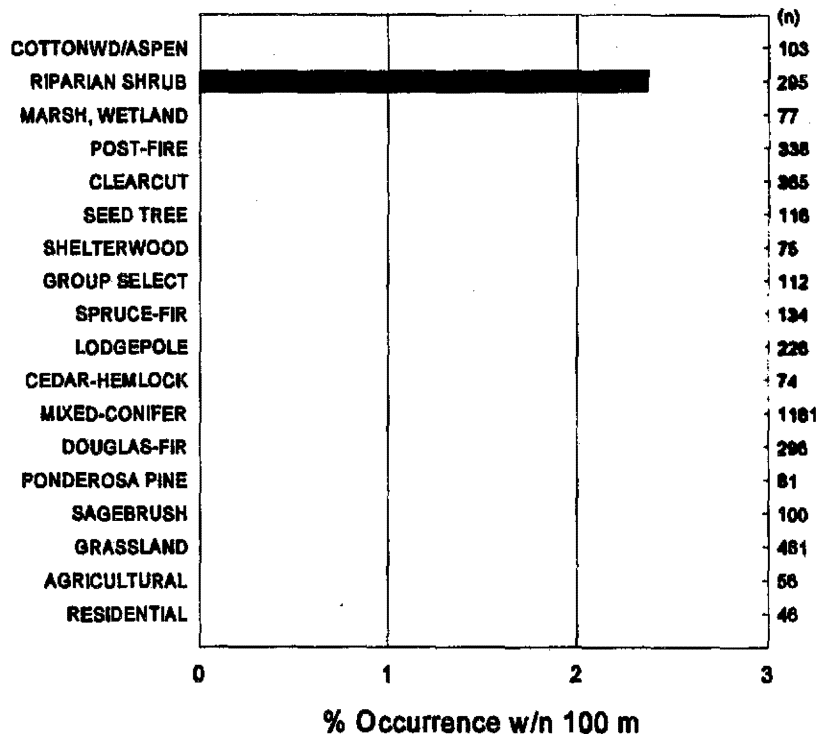


American Dipper

Distribution and habitat use. Dippers are restricted to the western part of the region (see map at right). They are also entirely restricted to fast-moving (higher elevation) stream environments (see histogram below).

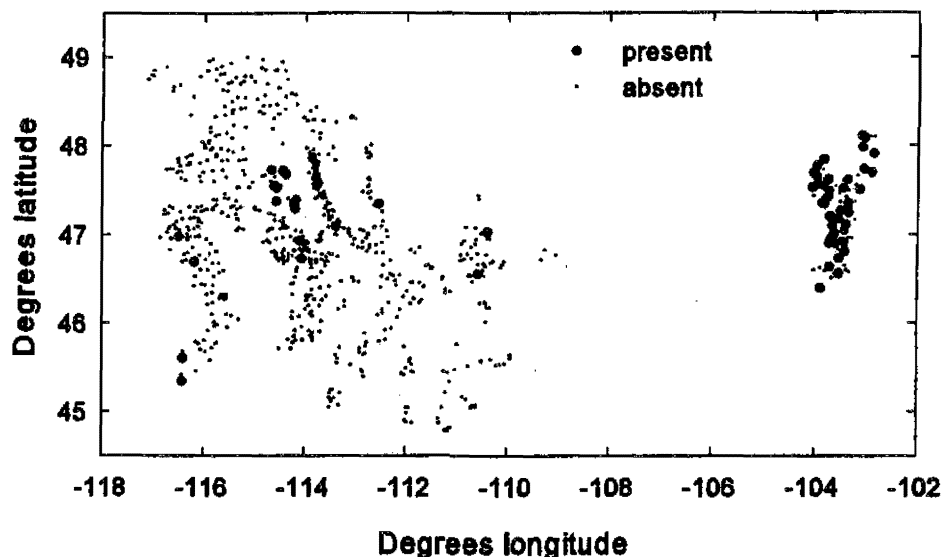


Management considerations. Because of their restriction to stream environments, any streamside management activity that effects them negatively may have serious consequences because they occur nowhere else! Perhaps American Dippers should be used as a monitoring tool to evaluate whether streamside management practices are truly compatible with wildlife needs.



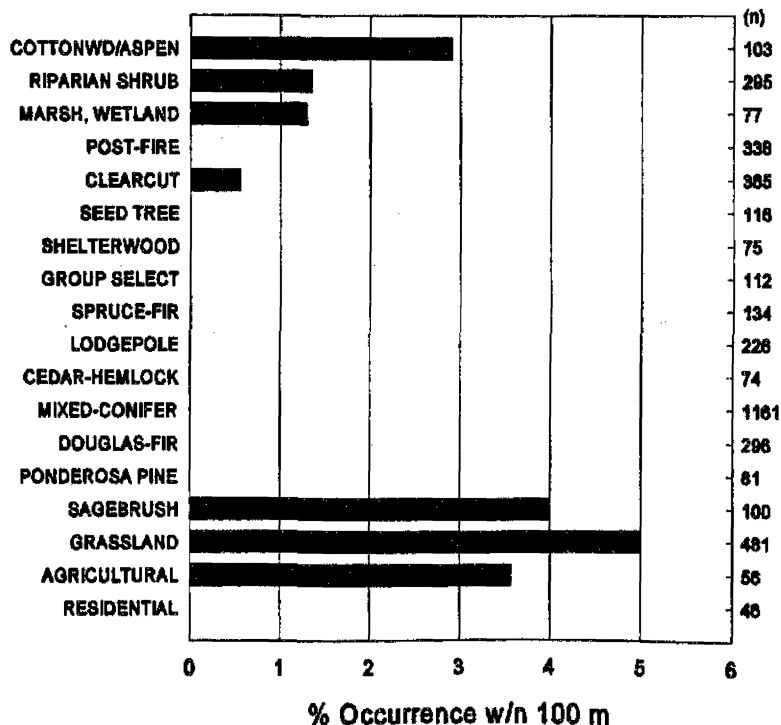
American Goldfinch

Distribution and habitat use. The American Goldfinch is distributed throughout the region (see map to right), where it occurs primarily in riparian bottomland forests and in agricultural areas that have large deciduous trees in the area (see histogram below).



Management Considerations.

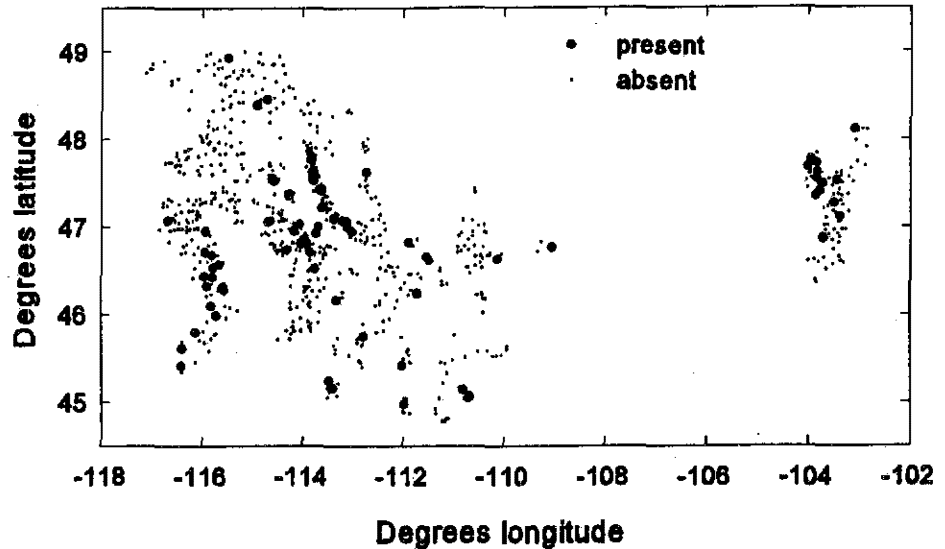
The only possible concern here is that the species appears to benefit from agricultural land use practices, but so do cowbirds. Given the relative restriction of this species to areas of high Brown-headed Cowbird density (riparian bottomlands and agricultural areas with riparian elements present), it would be worth looking into its nesting success.



American Kestrel

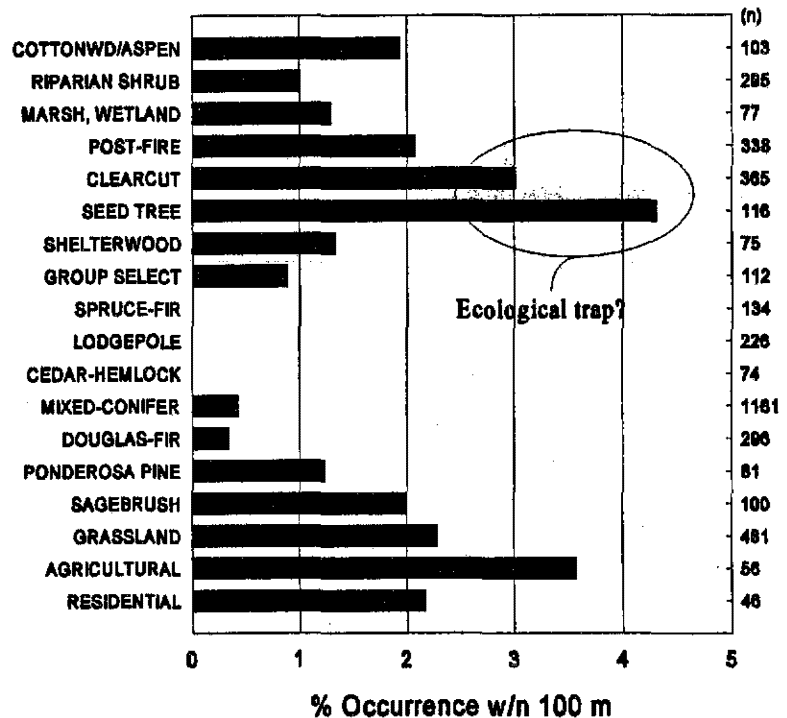
Distribution and habitat use.

American Kestrels occur throughout the region (see map to the right). They are open country, cavity-nesting birds that need large dead or dying trees for nesting purposes. They are especially common in agricultural areas and grasslands that have scattered trees throughout, but are typical of cottonwood bottomlands and heavily cut forests as well (see histogram below).



Management Considerations.

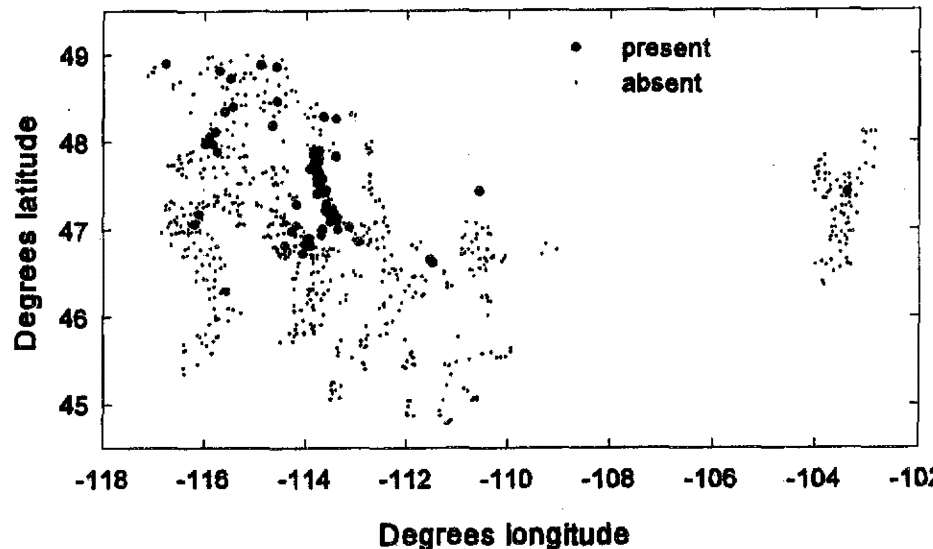
The abundance of this species in relatively heavily cut forests appears, on the surface, to reflect a high suitability of these forests to kestrels. However, because there are numerous aspects of such forests that are not typical of similar conditions created naturally, we should have nest success data in hand before concluding such; these areas may be acting as ecological traps.



American Redstart

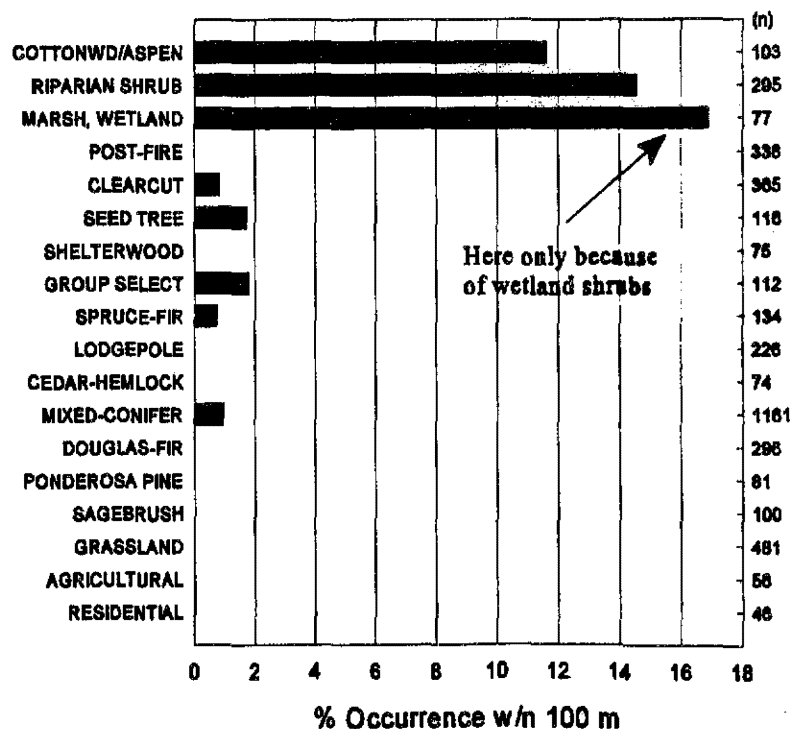
Distribution and habitat use.

The American Redstart occurs throughout the northern half of the region (see map at right). The species is restricted to riparian vegetation types (see histogram below), and within those, to riparian corridors that contain a good shrub layer. The scattered observations from conifer forest types are not biologically meaningful, nor is the apparent abundance in marshes--redstarts are there only because of shrubs associated with the wetland complex.



Management considerations.

The most pressing concern here is whether the "best management practices" near riparian areas are adequate to maintain productive redstart populations. The extent to which this species needs a matrix of relatively intact forest surrounding occupied streamside riparian corridors, for example, is unknown, as is the extent to which this species suffers from cowbird parasitism in the bottomland forests.

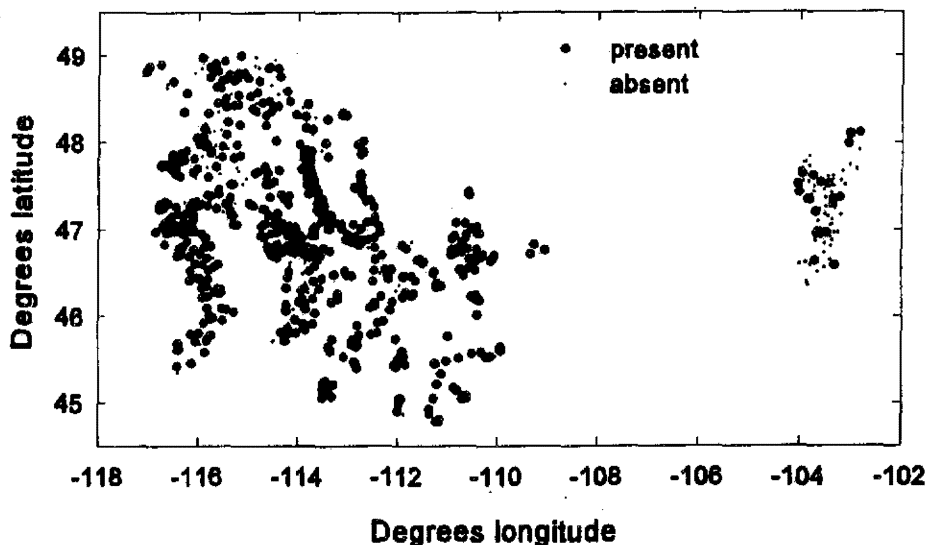


American Robin

Distribution and habitat use.

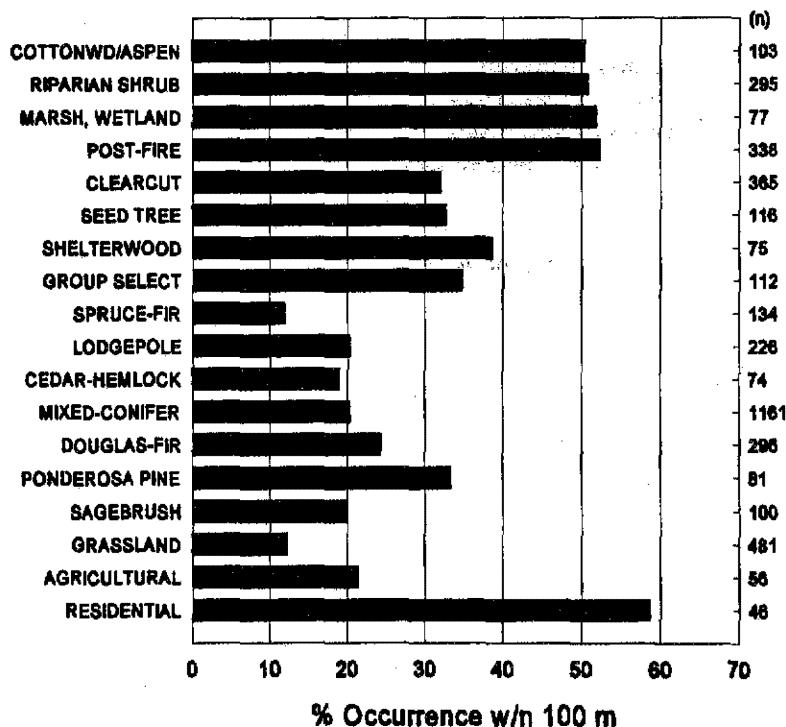
The American Robin is common throughout the region (see map at right). Robins occur in virtually every cover type available, but are relatively common in riparian areas, and in early successional forest stages after cutting or fire; they are most common in residential areas (see histogram below).

Accordingly, robins are significantly ($P < 0.001$) more likely to occur on points that are positioned near roads or riparian areas. Their occurrence is largely independent of the presence of edge except for the relatively undisturbed cover types, where their probability of occurrence is significantly greater when edge is near.



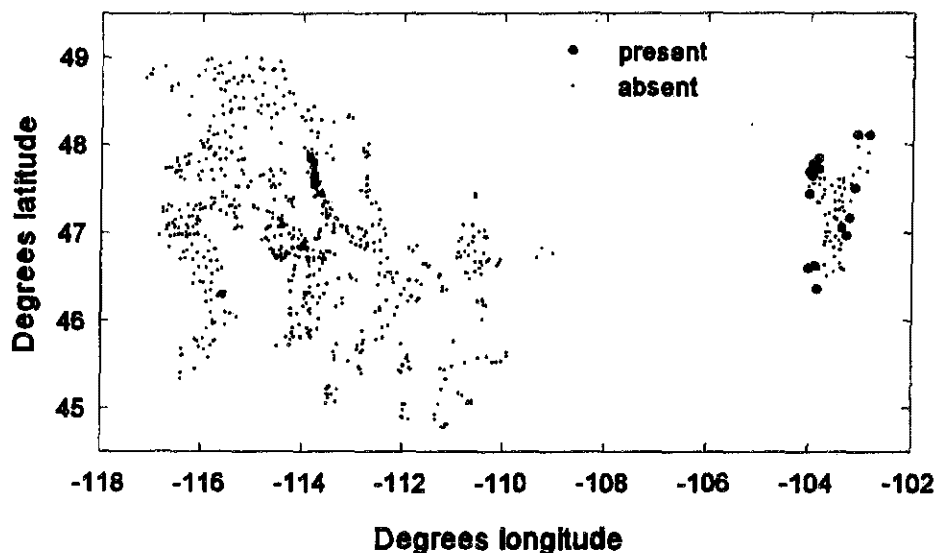
Management considerations.

Because of their breadth of habitat use, robins appear to be in decent shape.



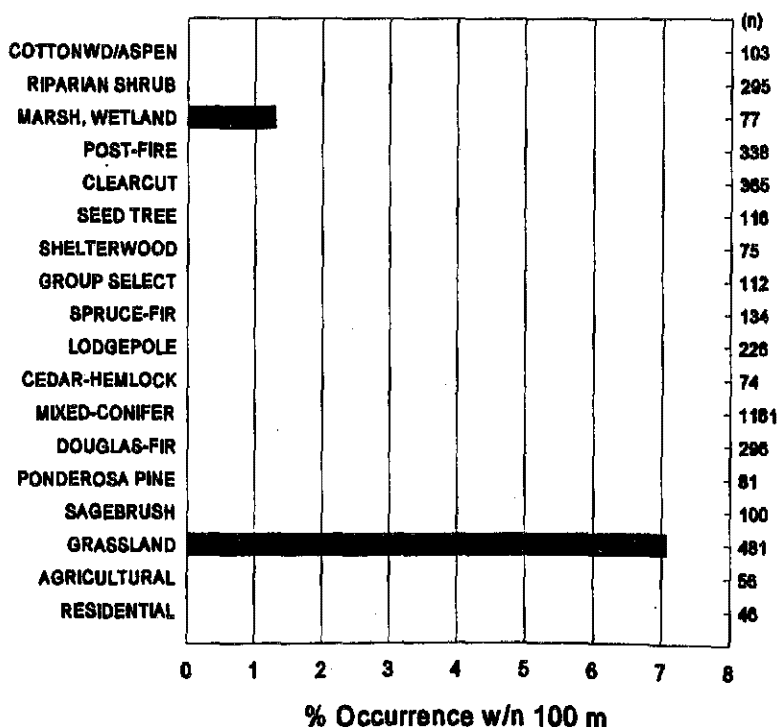
Baird's Sparrow

Distribution and habitat use. Baird's Sparrow is restricted to the eastern part of the region (see map at right), and has been detected only in the grassland cover type (see histogram below).



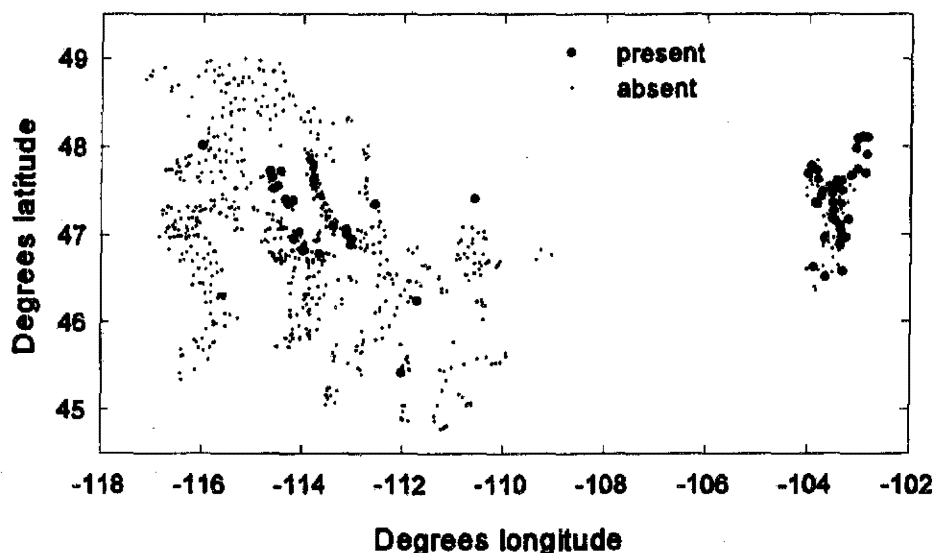
Management considerations.

The species appears to be declining throughout its range, mostly due to the conversion of native grasslands to agriculture. The eastern crew did not record the grazing status around points in 1994, so the effects of grazing based on our monitoring effort will have to wait until we incorporate the 1995 data.

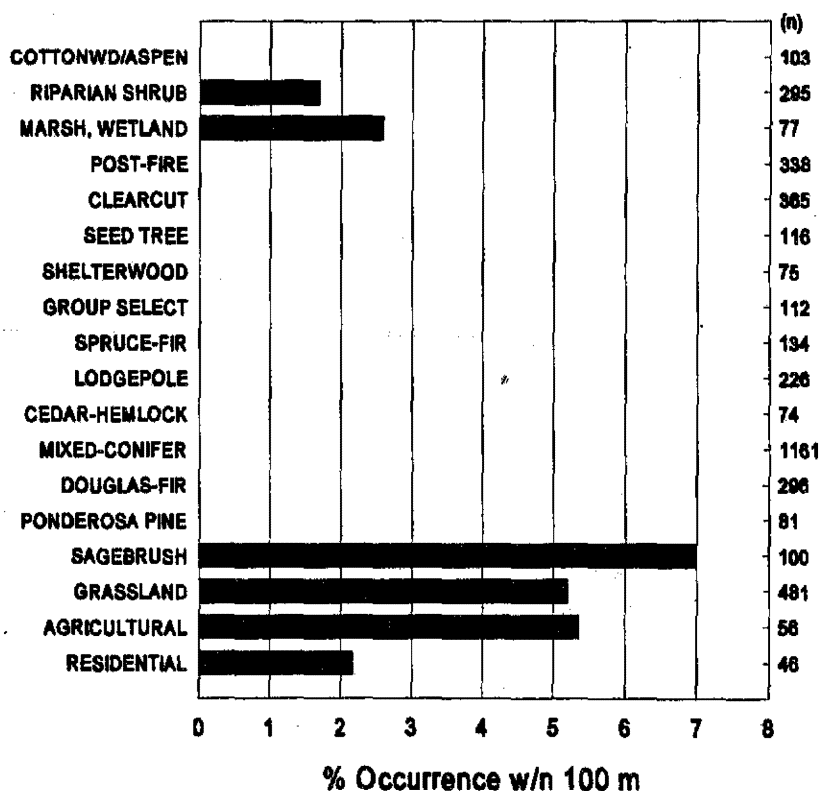


Barn Swallow

Distribution and habitat use. Barn Swallows occur throughout the region (see map at right). They are birds of low-elevation, open country, especially irrigated agricultural fields and natural wetlands (see histogram below), where they can be seen foraging low over the vegetation.



Management Considerations.
None suggested by the data.

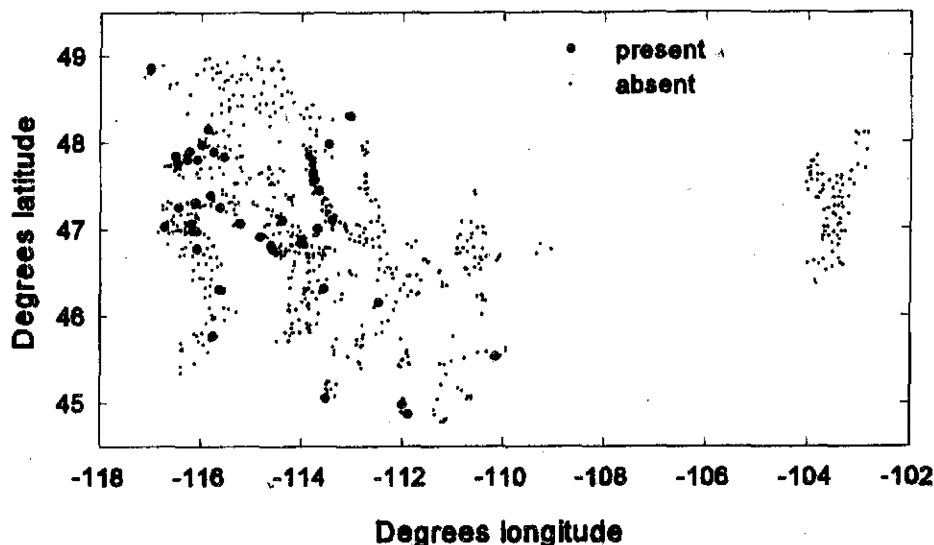


Belted Kingfisher

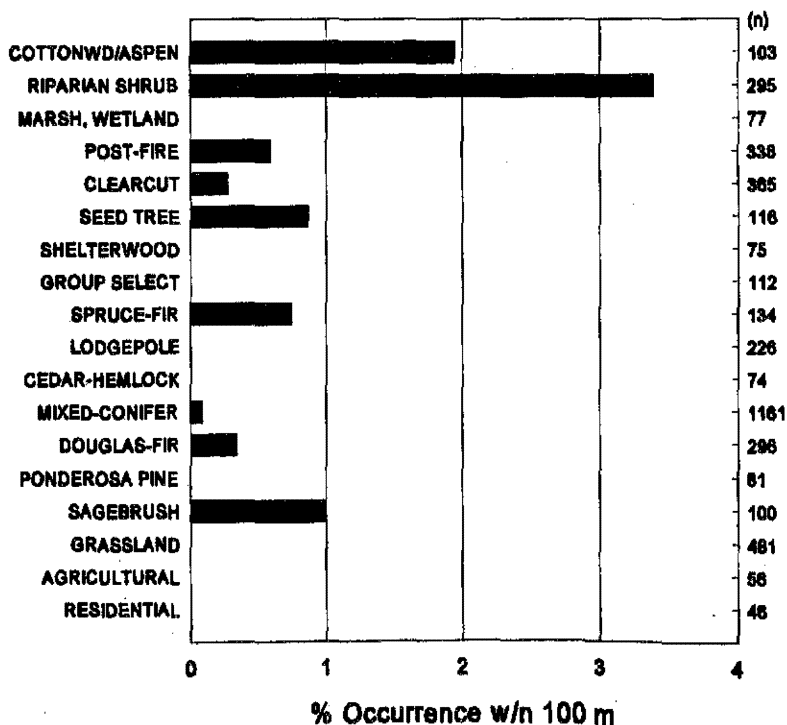
Distribution and habitat use.

Belted Kingfishers occur throughout the region, although the only detections came from the western portion (see map to the right). They are strictly tied to riparian corridors that contain some standing or slow moving water. The presence of scattered observations across a variety of additional cover types (see histogram below) probably reflects

the fact that this is a wide-ranging species that can be seen most anywhere as it makes its way from one patch of water to another. But how can this be, if we dropped flyovers from our analysis? If detected by their rattle call, it's hard to tell whether a bird is flying or not. Thus, most were probably flyovers, but not recorded as such.



Management Considerations. This bird should be a good indicator of stream quality, and could be used as a tool to monitor whether streamside "best management practices" really meet the needs of wildlife species. Are they affected by streamside land-use practices? We could use answers here.

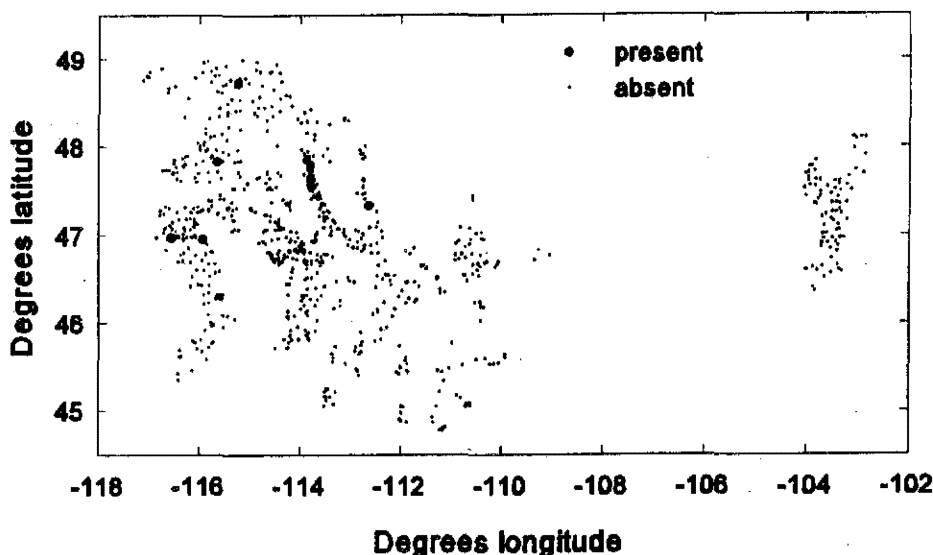


- Black-backed Woodpecker

Distribution and habitat use.

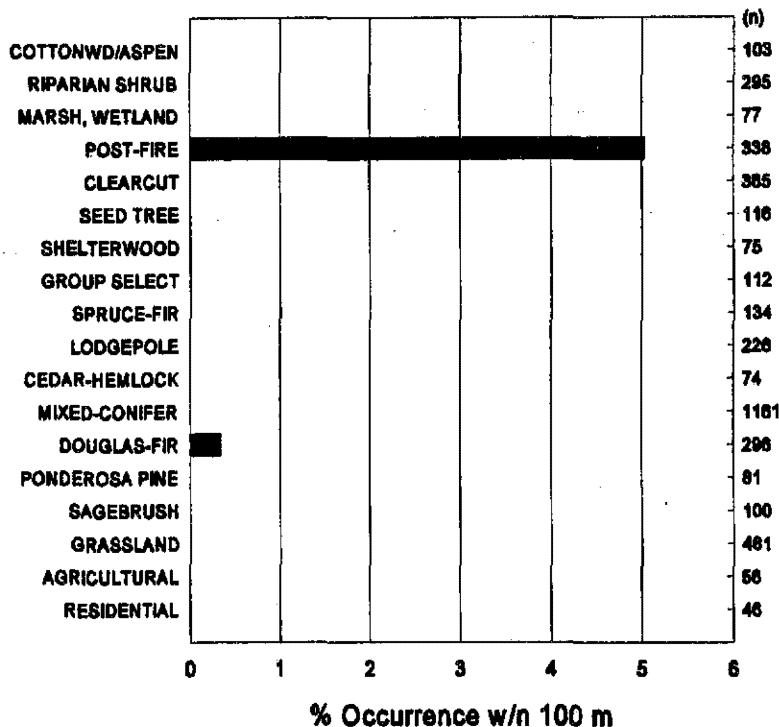
Black-backed Woodpeckers are restricted to the northwestern part of the Region (see map at right). Therein, this species is nearly restricted to early post-fire habitat (see histogram below). This pattern is virtually identical to the pattern of habitat use that I determined from other census data in the published literature (presented in Hutto, R. L.

1995. The composition of bird communities following stand-replacement fires in northern Rocky Mountain conifer forests. *Conservation Biology* 9:1041-1058). The probability of detecting this woodpecker is unrelated to whether roads, edge, or riparian cover types are near.



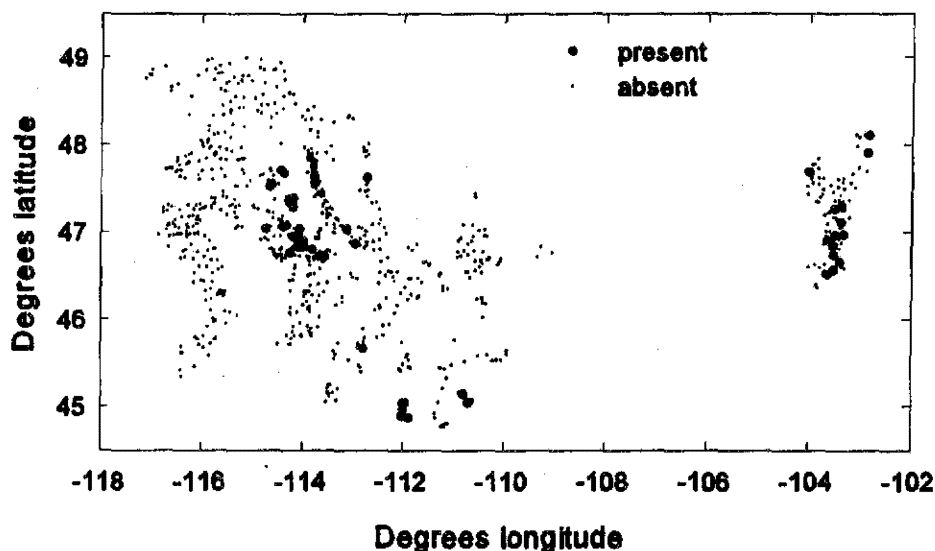
Management considerations.

Make no mistake about it, this species poses a critical management issue because of its extremely narrow habitat breadth. The availability of habitat for this species is negatively affected by the prevention of stand-replacement fires, and the suitability of habitat in areas that **do** manage to burn is certainly negatively affected (if not altogether zeroed out) by post-fire salvage cutting. See the paper cited above for a more information.

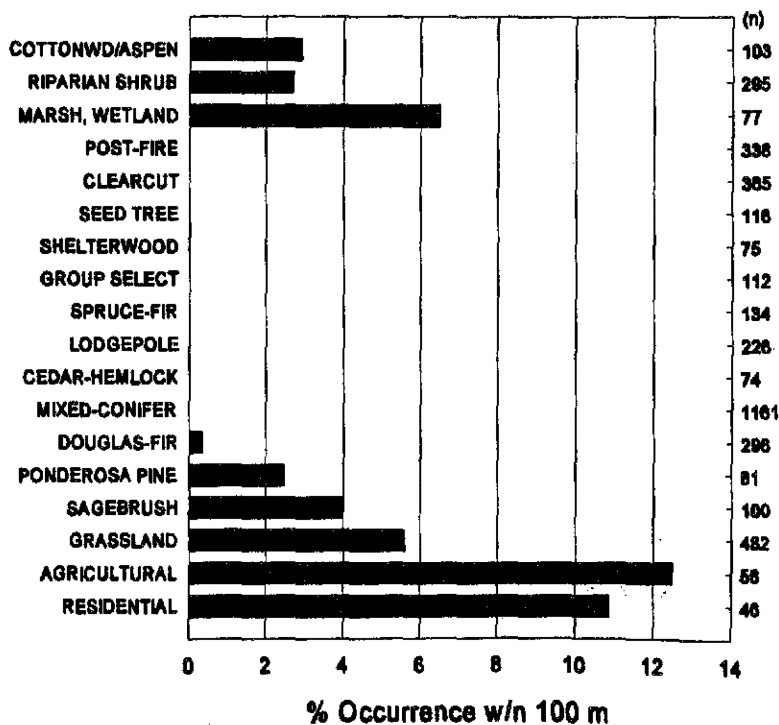


Black-billed Magpie

Distribution and habitat use. Black-billed Magpies occur throughout the region (see map at right); they are most closely tied to agricultural lands and, although not apparent from our data, cottonwood bottomlands (see histogram below).



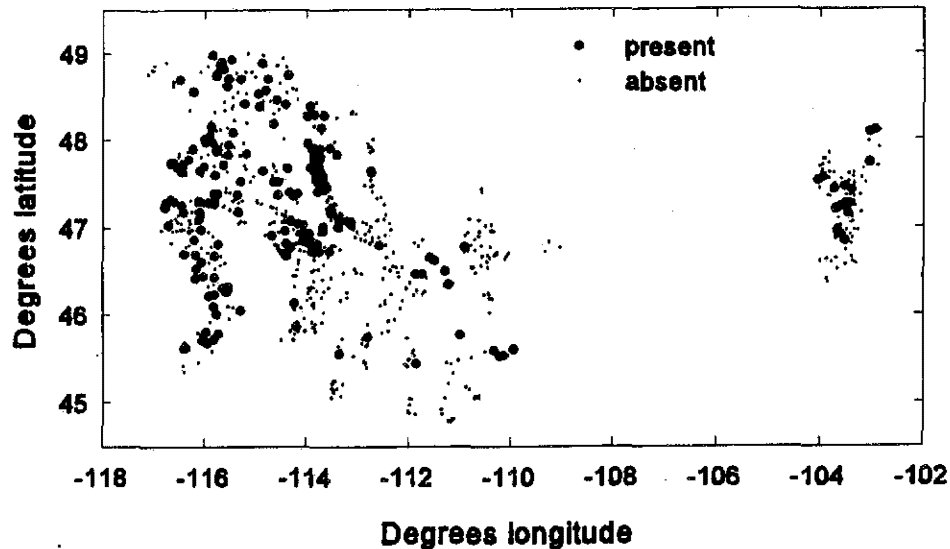
Management Considerations.
None suggested by the data.



Black-capped Chickadee

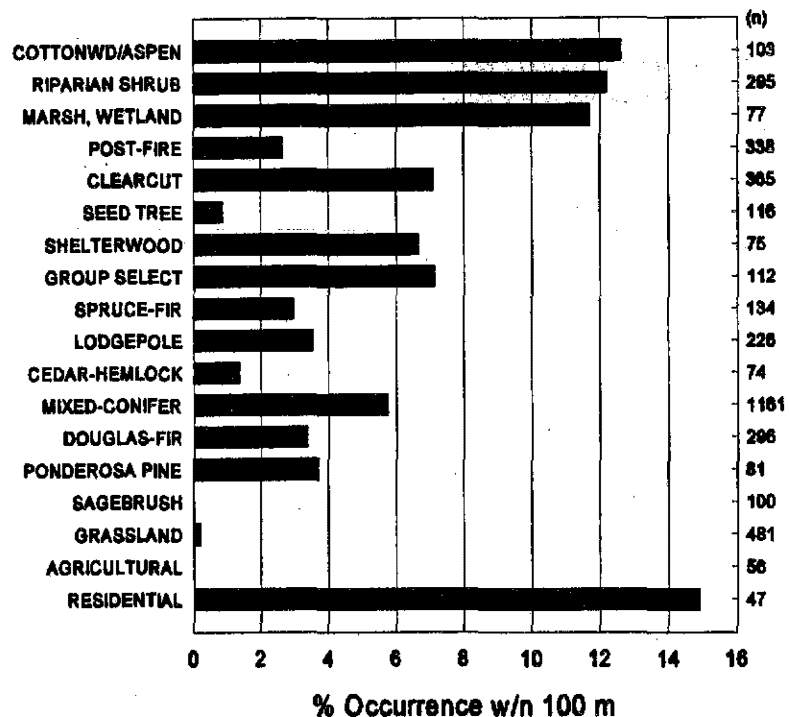
Distribution and habitat use.

Black-capped Chickadees are distributed throughout the region (see map at right). Of the three chickadee species, this one is relatively common in riparian and residential cover types (see histogram below). In fact, I suspect that most of the detections in the conifer forest types are mis-identifications by observers who were willing to call the species on the basis of song alone.



Management considerations.

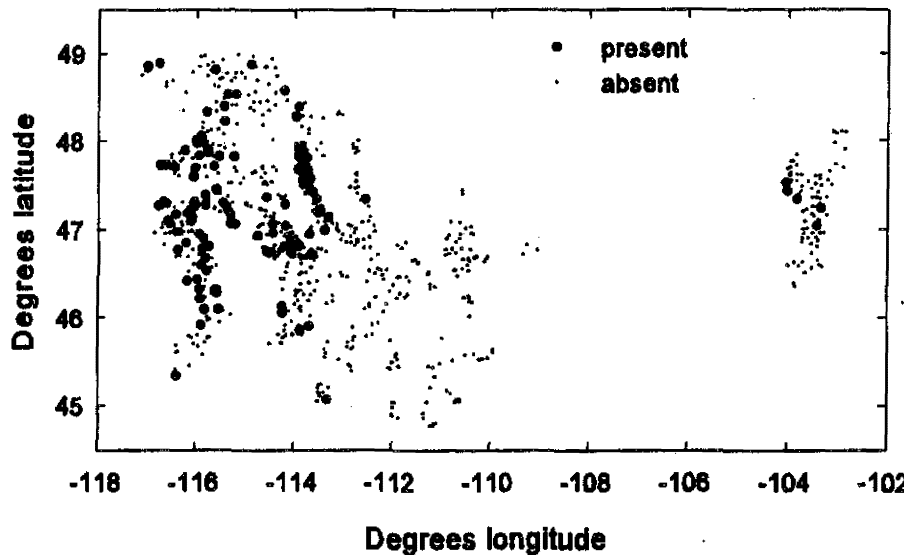
Because the species is relatively restricted in its habitat distribution, the main concern with this chickadee species is whether the riparian "best management practices" truly allow for successful reproduction in those riparian areas. The species also depends on snags, especially rotting stumps. Thus, excessive woodcutting in riparian areas may be a concern as well.



Black-headed Grosbeak

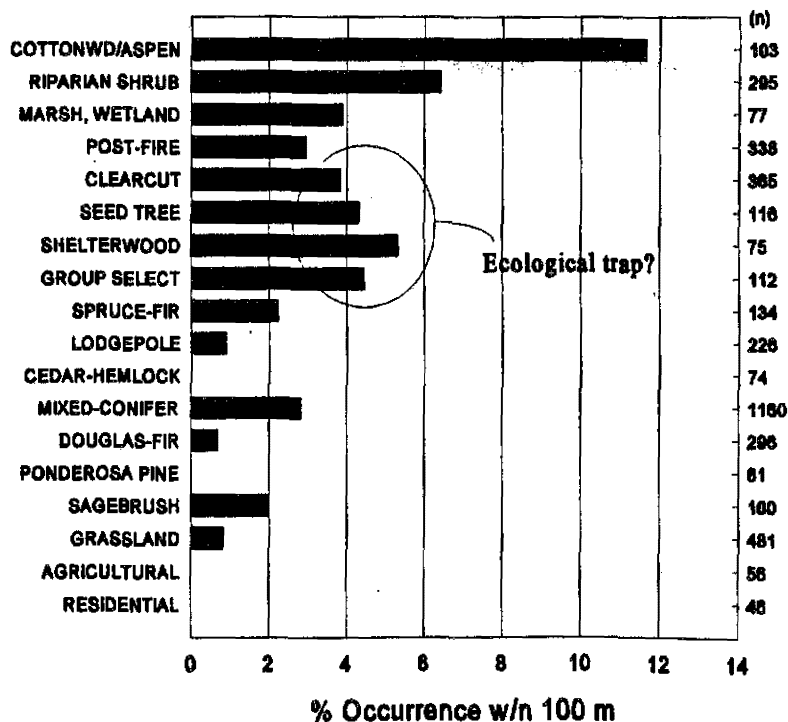
Distribution and habitat use.

Black-headed Grosbeaks occur throughout the region (see map at right), and are most typical of riparian bottomland forests (see histogram below). They also appear to do reasonably well in variously cut forest types (see histogram below).



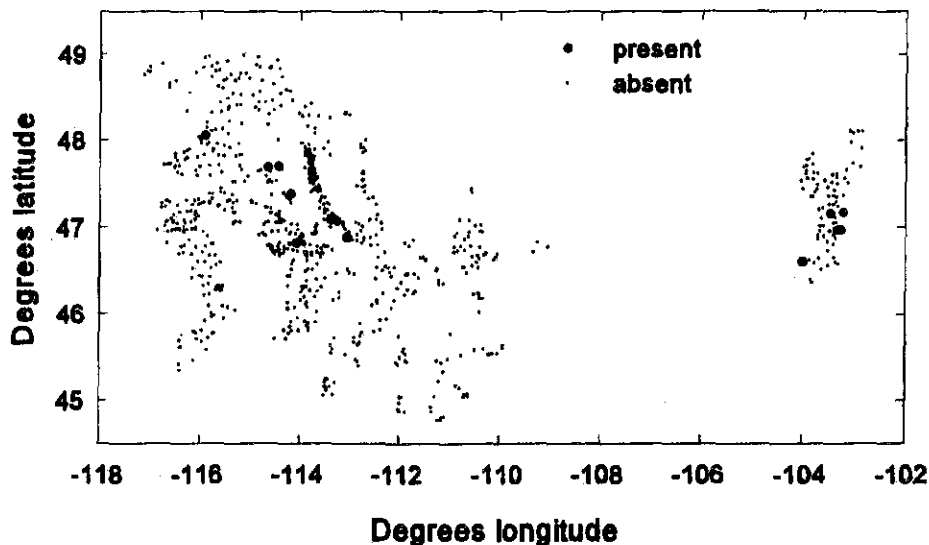
Management Considerations.

Even though the occurrence of Black-headed Grosbeaks in harvested forests is some three times less frequent than in riparian bottomlands, the land area covered by cut forests is substantially greater. Thus, if cut forests are acting as "ecological traps" by having the appropriate superficial characteristics but being otherwise unsuitable, there is potential for a serious negative impact of cutting on this species.



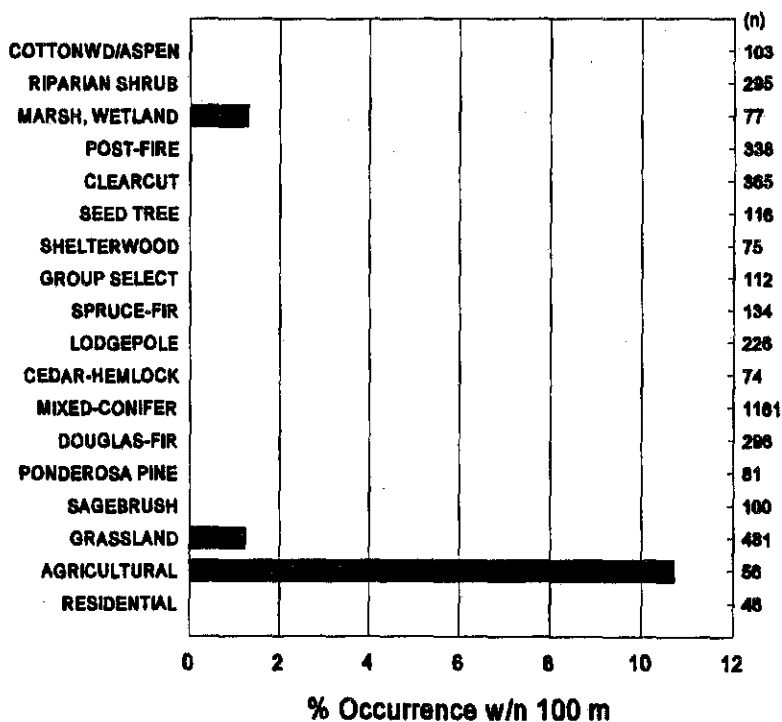
Bobolink

Distribution and habitat use. Bobolinks occur throughout the region (see map at right) in lower elevation, moist agricultural lands and grasslands (see histogram below).



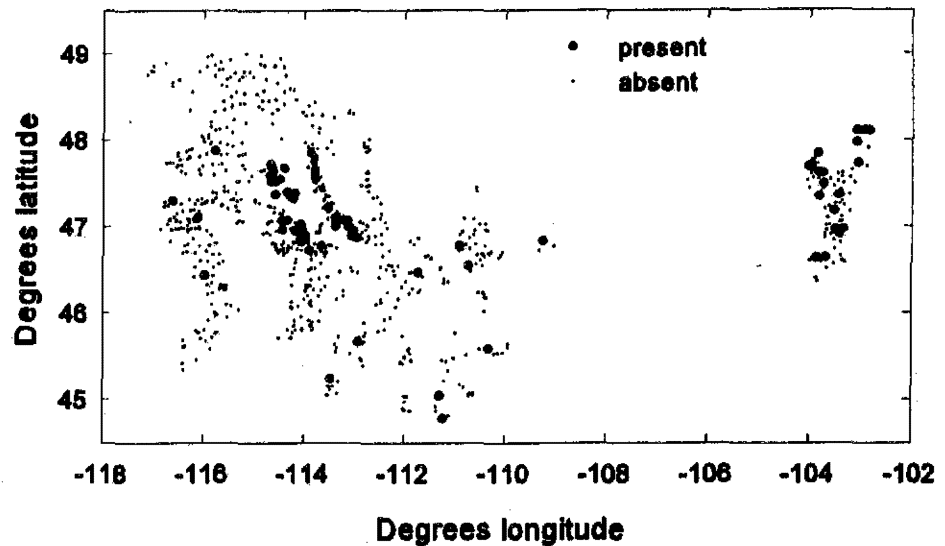
Management Considerations.

Under natural conditions, this species occurs around relatively moist grasslands where they nest on the ground. Managers concerned about the maintenance of Bobolink populations should determine whether the irrigated agricultural fields are really adequate substitutes or not. I am aware of no studies on nesting success of this species in fields that may be heavily disturbed by farm machinery.

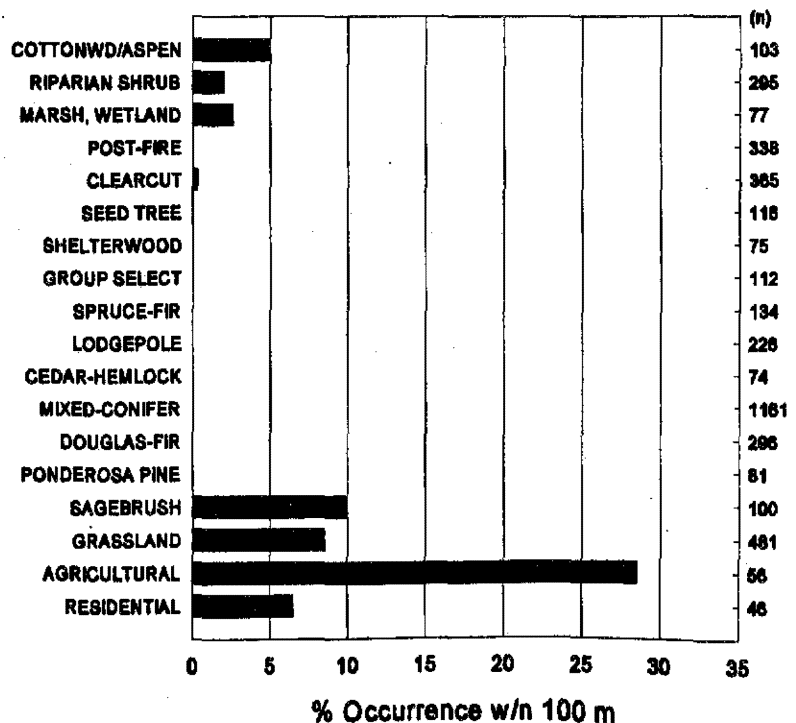


Brewer's Blackbird

Distribution and habitat use. Brewer's Blackbirds occur throughout the region (see map at right). They are tightly associated with agricultural lands and open country immediately adjacent to such lands (see histogram below).

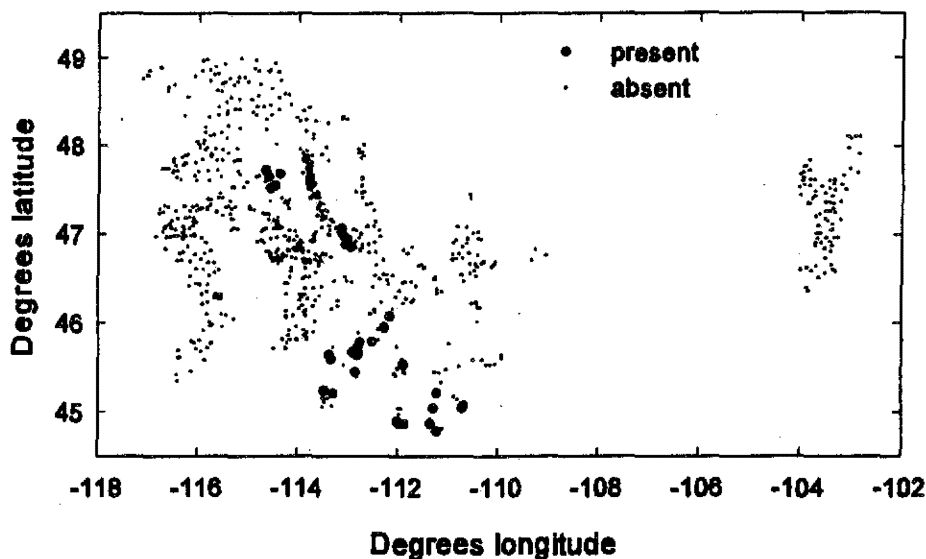


Management Considerations.
None suggested by the data.

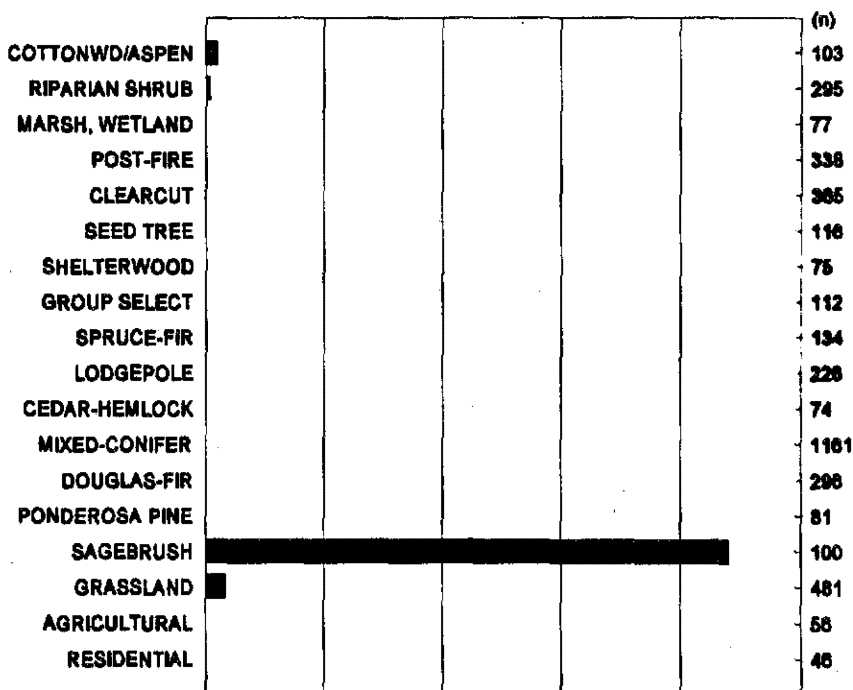


Brewer's Sparrow

Distribution and habitat use. Brewer's Sparrow occurs throughout the region, although we only detected them in the west-central portion (see map at right). This species is relatively restricted to sagebrush habitat (see histogram below).



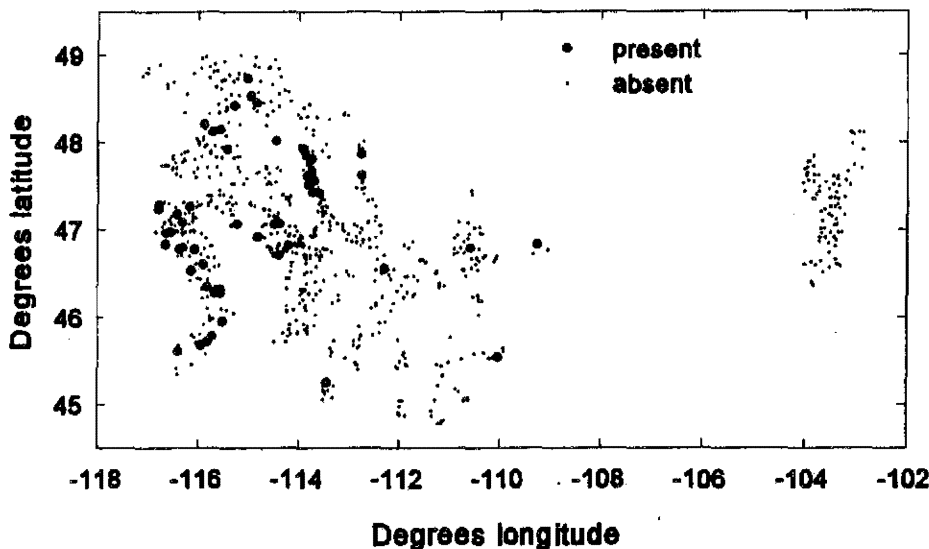
Management Considerations. Because the species is so highly restricted in its habitat distribution, and because it is one of the most severely declining songbird species on a nationwide basis, we should be focusing on this species in studies of the effects of sagebrush land-use practices on wildlife species. We do not have enough data from both heavily grazed and lightly grazed conditions to comment on potential effects; perhaps after the 1995 data are incorporated we can comment further.



Brown Creeper

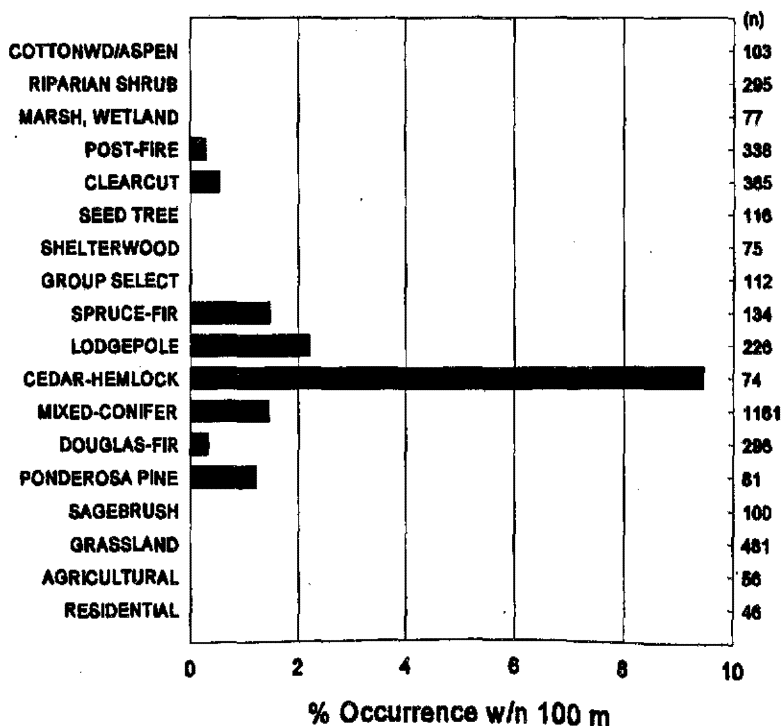
Distribution and habitat use.

Brown Creepers are restricted to the western part of the region (see map at right). Creepers are nearly restricted in distribution to relatively undisturbed conifer forest types, especially cedar-hemlock forests (see histogram below). They are approximately six times more likely to occur on points that have many (2.3% occupied) vs. no snags (0.4% occupied) within a 10-m radius, and are twice as likely to occur on points that occur more than 100m from a road (vs. roadside points).



Management considerations.

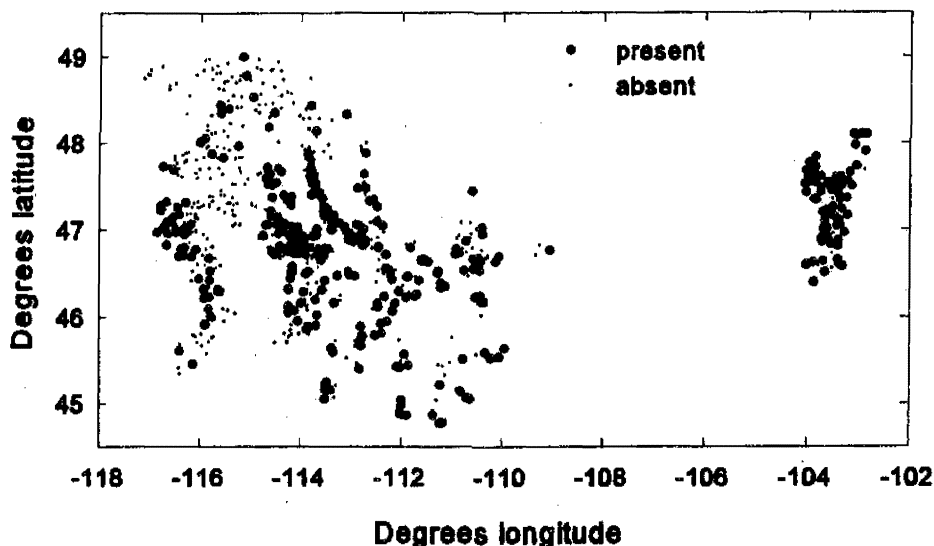
No other songbird species is as restricted to relatively undisturbed forests as creepers are. Of nearly 10,000 point counts conducted to date, we can count on one hand the number of times creepers have been detected from harvested forest types. The implications for management of conifer (especially cedar-hemlock) forests should be abundantly clear: we need to maintain relatively old, undisturbed forests on the landscape if we wish to maintain viable populations of this species.



Brown-headed Cowbird

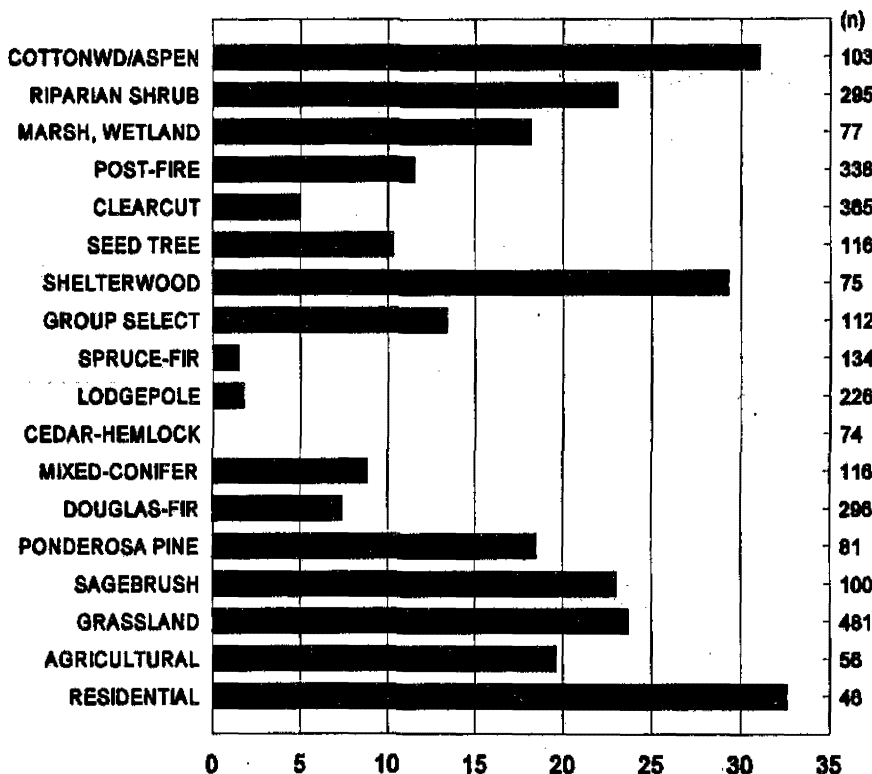
Distribution and habitat use.

Brown-headed cowbirds are distributed throughout the region, although they are possibly less widespread in the northwestern corner (see map at right). They occur across a wide variety of cover types (see histogram below), but are much more abundant in the lower elevation riparian bottomlands and surrounding agricultural areas.



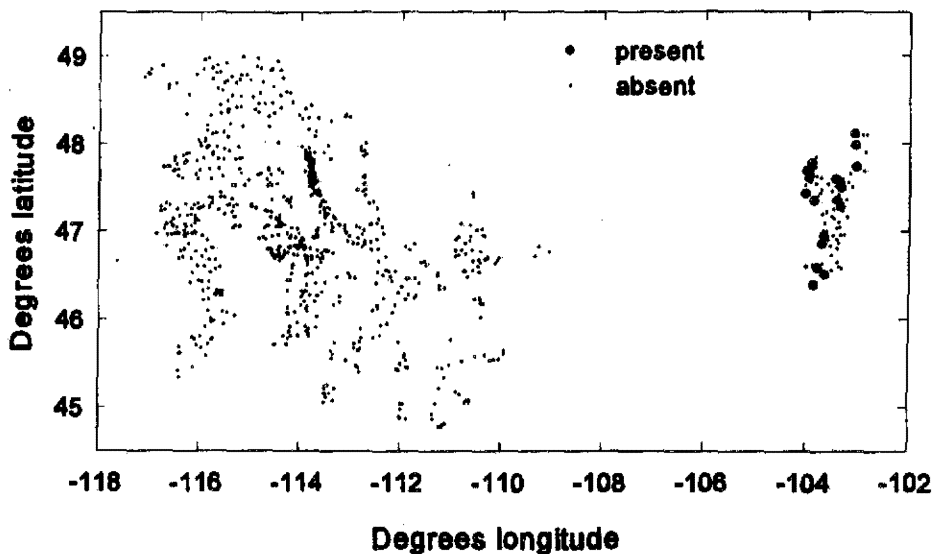
Management Considerations.

Because cowbirds were pretty much restricted to the Midwest until their expansion with the cattle industry, numerous western songbird species that had not evolved in the presence of cowbirds are now experiencing parasitism for the first time, and at rates that may be too great for them to counter in an adaptive sense. It's an interesting phenomenon, but one that does not bode well for riparian dependent species that occur in the presence of high cowbird densities. We desperately need studies to determine how cowbird densities and parasitism rates are related to alternative land-use practices under USFS control.

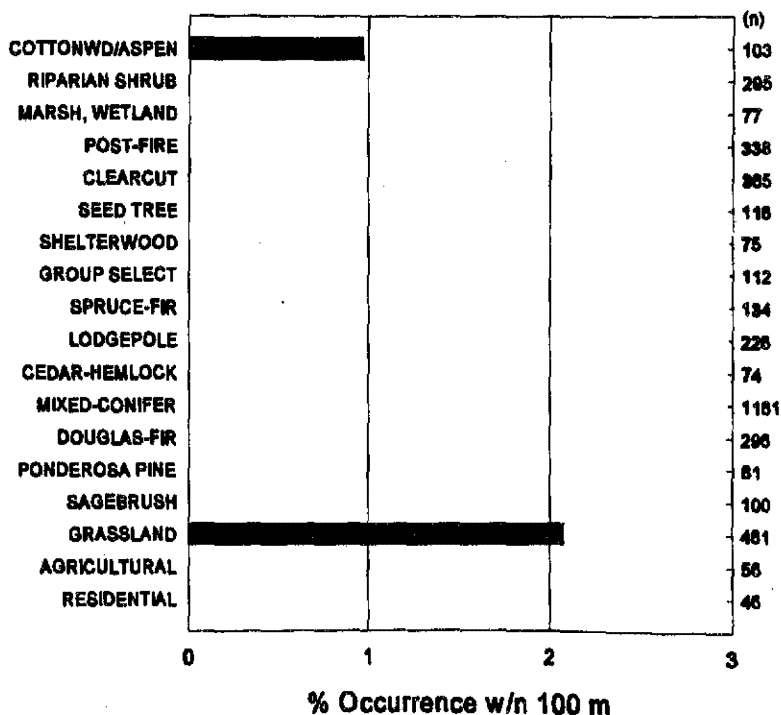


Brown Thrasher

Distribution and habitat use. Brown Thrashers are restricted to the eastern part of the region (see map at right). They are birds of riparian bottomlands and adjacent open grasslands (see histogram below).



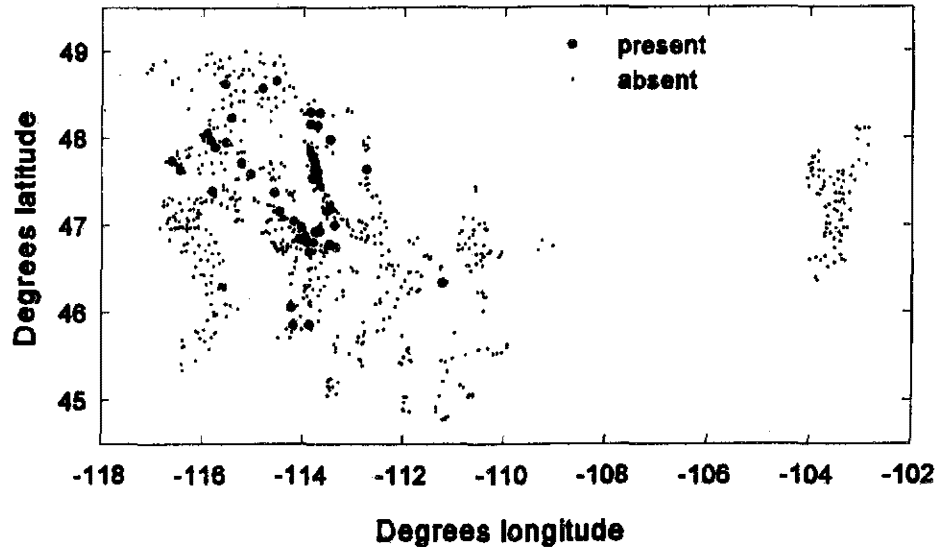
Management Considerations.
None suggested by the data.



Calliope Hummingbird

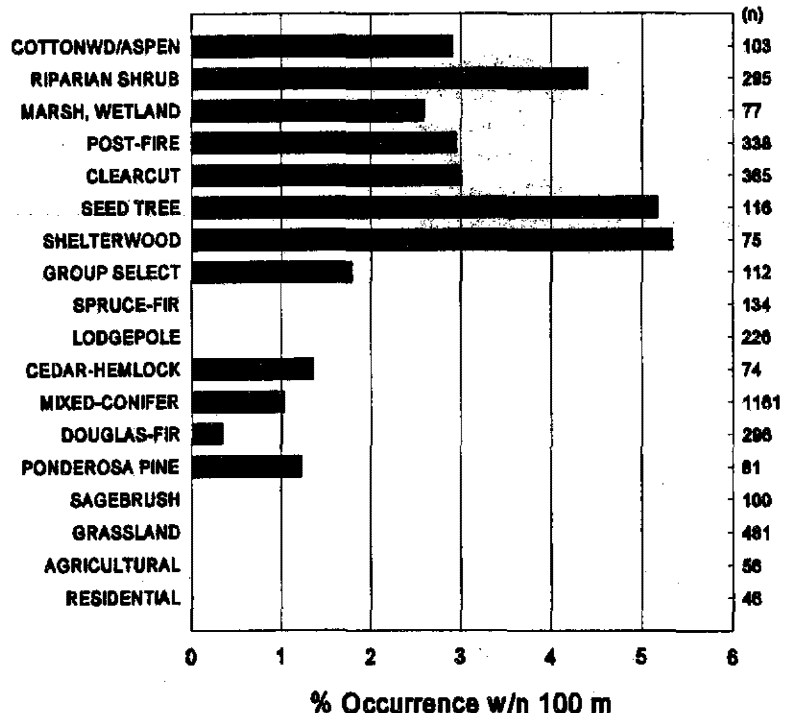
Distribution and habitat use.

Calliope Hummingbirds are restricted to the western part of the region (see map at right). The two sexes use largely different cover types; the males rely most heavily on open shrubfields in early successional patches where they use tall shrubs as perch sites and display areas, and the females nest primarily in riparian streamside vegetation and road/forest edges.



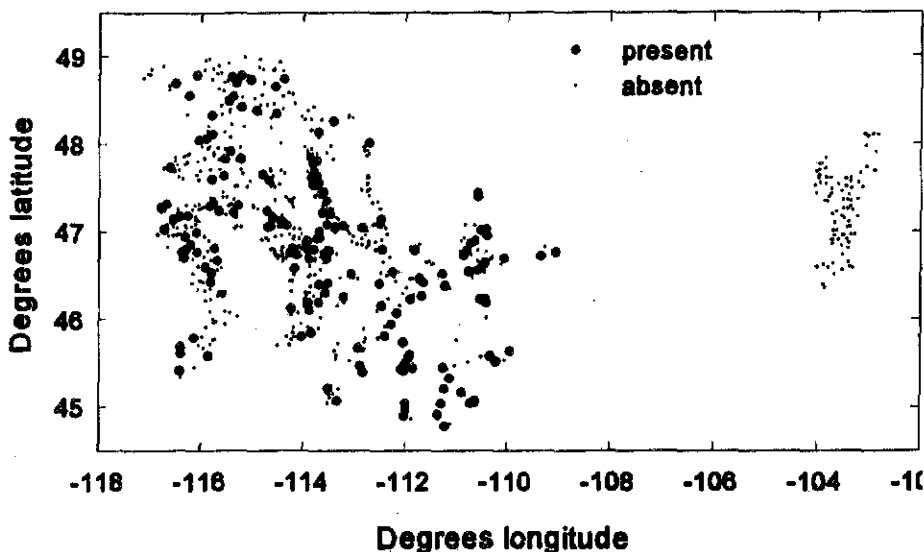
Management Considerations.

None suggested by the data.



Cassin's Finch

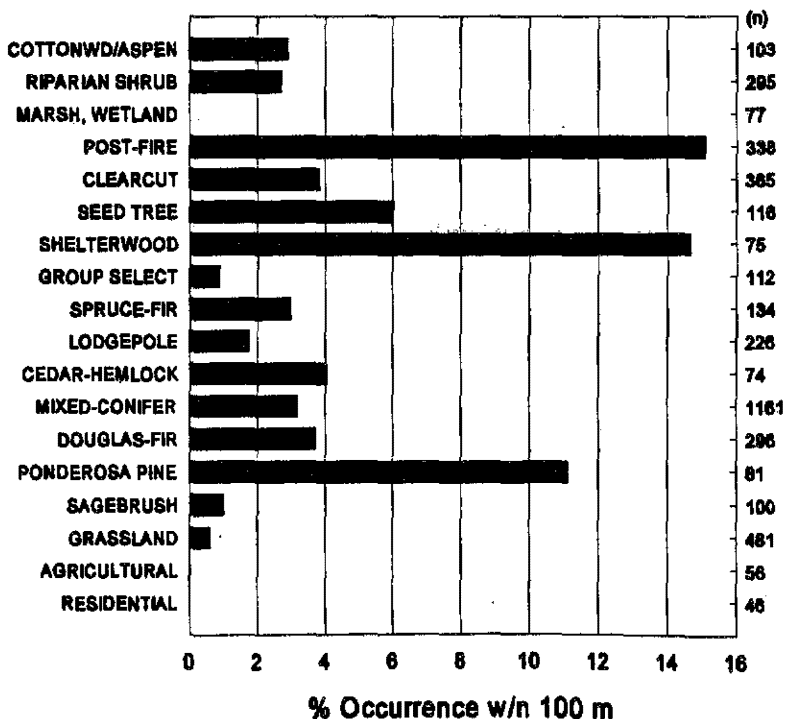
Distribution and habitat use. Cassin's Finch occurs throughout the western portion of the region (see map at right). They occur across most of the conifer forest types, but are detected most frequently in early post-fire situations, shelterwood cuts, and ponderosa pine forests (see histogram below) where they apparently hone in on conifer seed production.



Management Considerations.

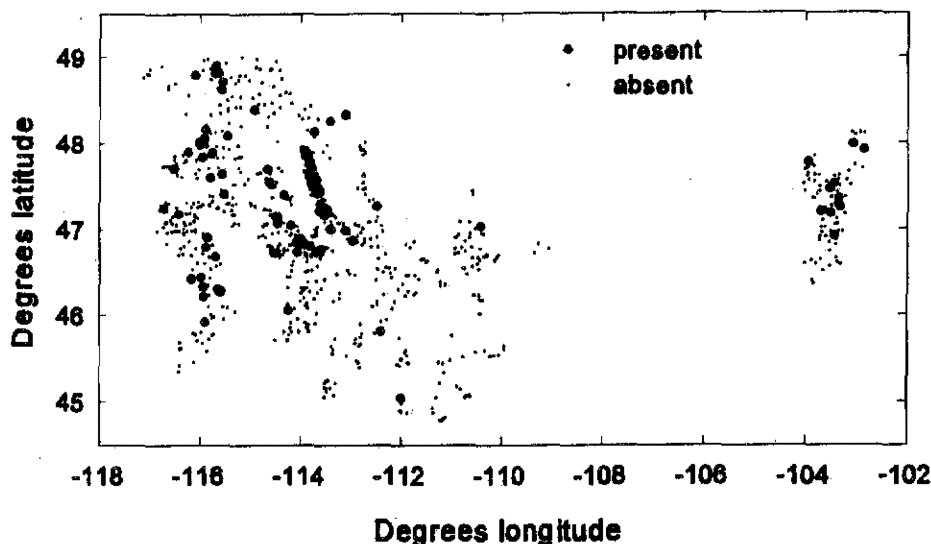
The seed resources that become available shortly after a stand-replacement fire may be important to this species. Thus, post-fire salvage cutting may be in direct conflict with its needs.

Shelterwood cuts look quite suitable, but they may act as "ecological traps" by creating stands that take on a post-fire-like, open appearance but fail to provide needs otherwise. In this instance, however, I believe the other needs of this species are likely to be provided as well because the cone (seed) production in the remaining trees often increases after harvesting.



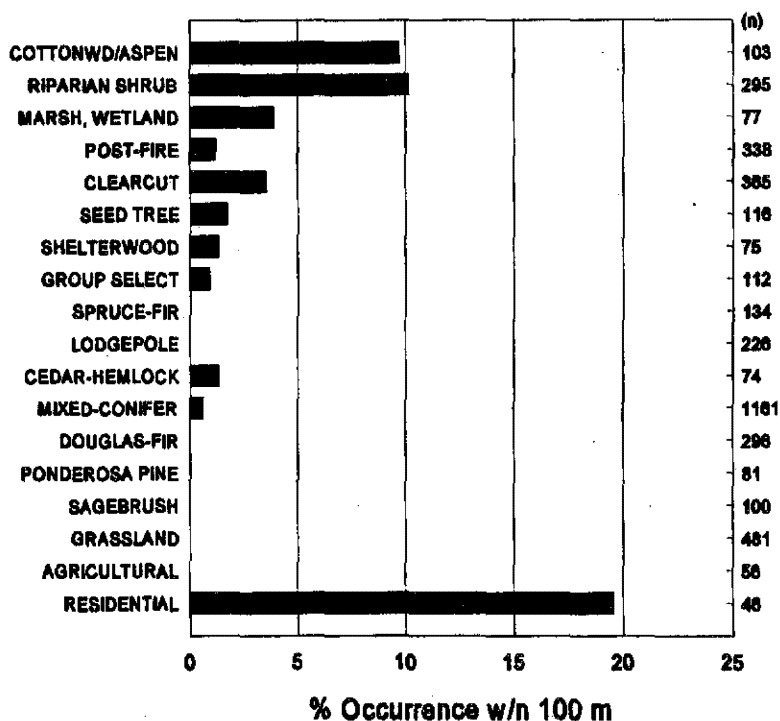
Cedar Waxwing

Distribution and habitat use. Cedar Waxwings occur throughout the region (see map at right) in riparian corridors (see histogram below). The relative abundance of this species in residential areas is somewhat misleading because waxwings arrive later than most songbirds. During their rather late passage, they are detected frequently in residential areas, but much less thereafter.



Management Considerations.

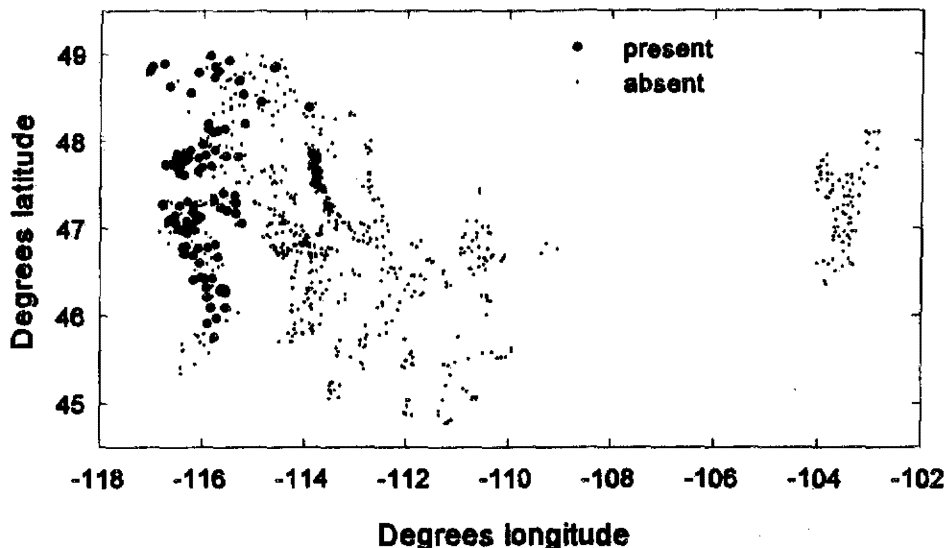
This species is relatively restricted to riparian vegetation types, so it shares the same concerns that I have with all others similarly restricted: Are streamside management practices providing for the needs of species that are relatively restricted to such conditions? Grazing issues might be particularly important for this species because they depend on the fruit resources provided by shrubs, which is one vegetation layer that virtually disappears under heavy grazing pressure.



Chestnut-backed Chickadee

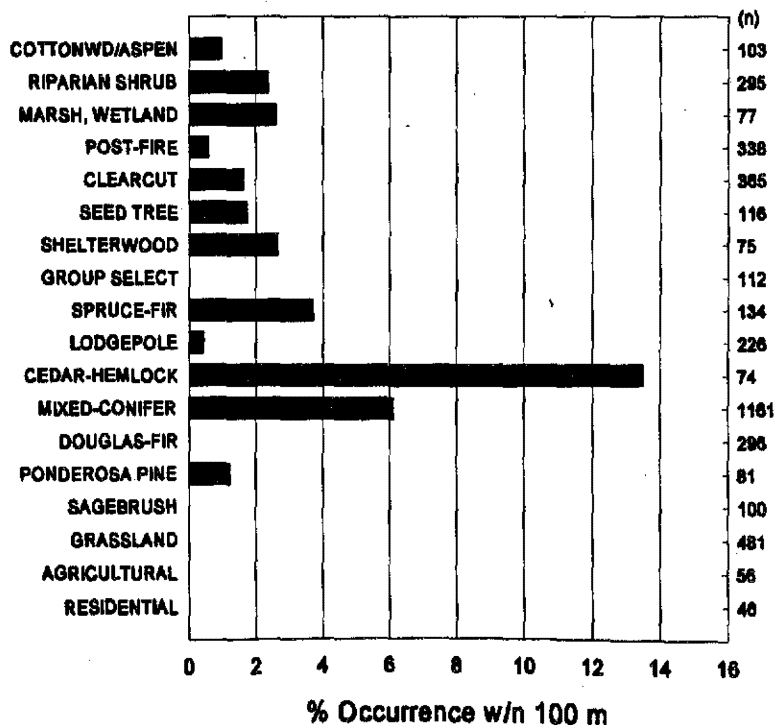
Distribution and habitat use. Chestnut-backed Chickadees are restricted to the moist, western part of the region (see map at right). This species is clearly associated with cedar-hemlock forest, where it is more than twice as common as in any other conifer forest type (see histogram below).

They are nearly five times more abundant on points with high snag densities (5.3% occupied) than on points without snags nearby (1.2% occupied), and they are nearly ten times more abundant on points with lots of dead and down (4.7% occupied) than on points without such (0.5% occupied).



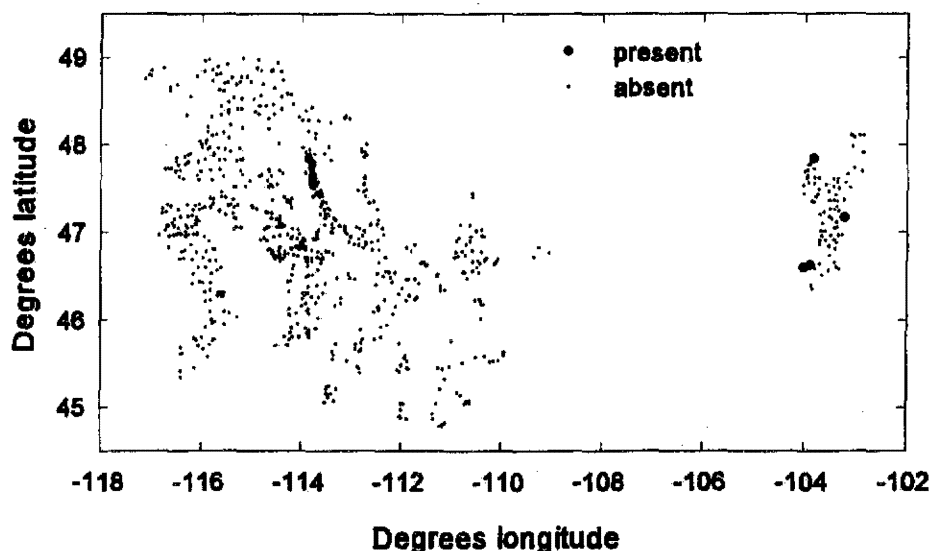
Management considerations.

If landscapes are not managed to maintain older, relatively undisturbed forests (in this instance, cedar-hemlock) this species will undoubtedly decline in the region.



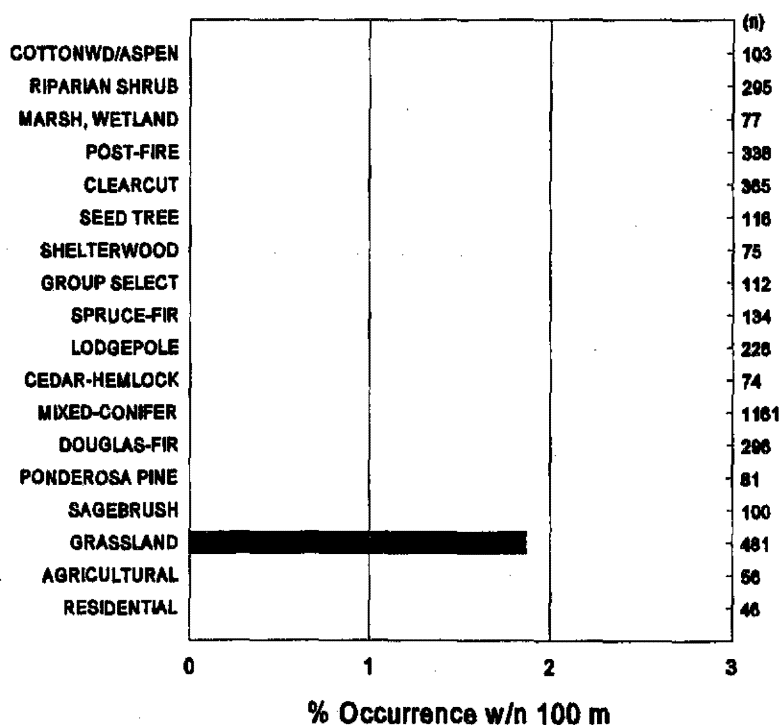
Chestnut-collared Longspur

Distribution and habitat use. Chestnut-collared Longspurs occur throughout the region (see map at right), where it is entirely restricted to grassland habitat (see histogram below).



Management Considerations.

Because this species is so restricted in its habitat distribution, we desperately need information on how it might be affected by alternative land-use practices on managed grasslands. We currently have no information on the effects of grazing, but may after the inclusion of the 1995 data.

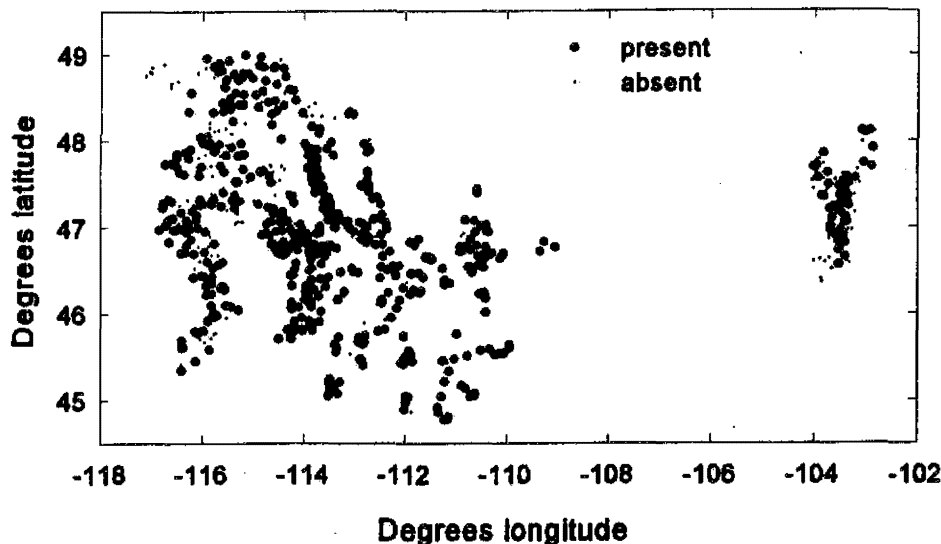


Chipping Sparrow

Distribution and habitat use.

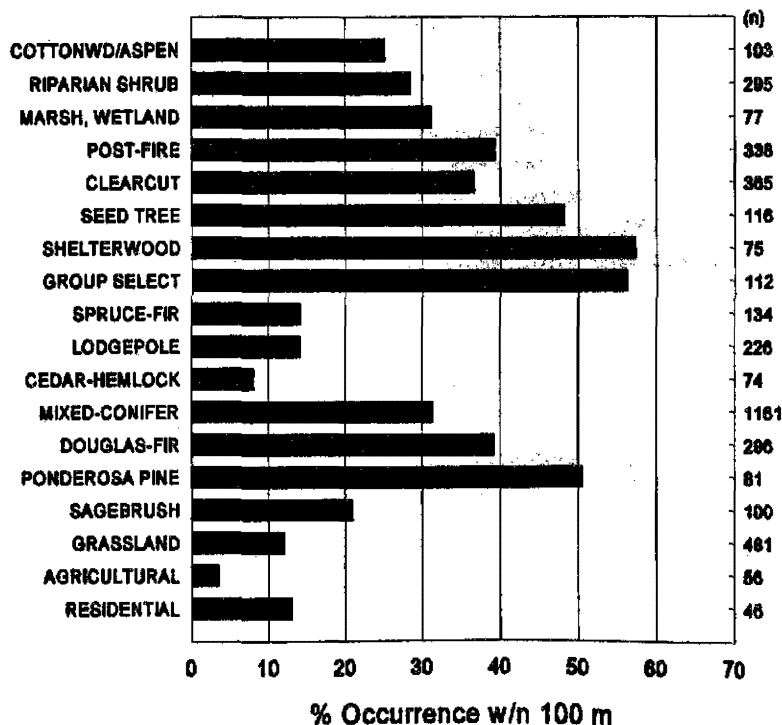
Chipping Sparrows are widely distributed throughout the region (see map at right). They are most abundant in the open, dry forest types and in forests that have become open through timber harvesting activity (see histogram below). They are slightly but significantly ($P < 0.001$) less likely to occur in areas with lots of snags (22.3% occurrence) than with no snags (31.8% occurrence).

The same goes for dead and down (24.9% vs. 28.4% occurrence). They are slightly but significantly more likely to occur near (32.6% occurrence) than away from (26.7% occurrence) edges, and are less likely to occur near riparian (24.5% occurrence) than away from riparian areas (32% occurrence).



Management considerations.

The species is abundant and widespread, yet western population trends show declines! We might need to look in some of the managed cover types to see if reproductive success is as good as implied on the basis of our census data.



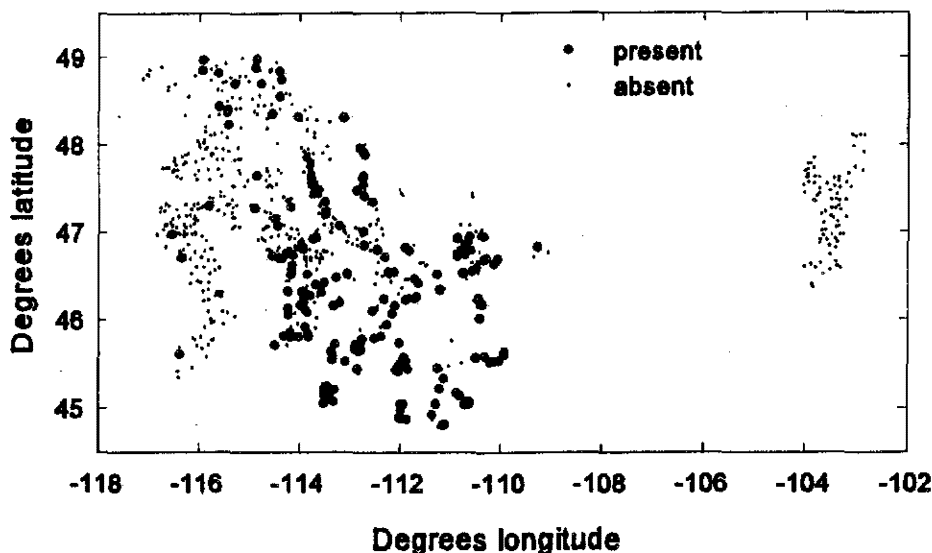
Clark's Nutcracker

Distribution and habitat use.

Clark's Nutcracker is a species of the western portion of the region (see map at right) where it occurs primarily in higher elevation conifer forests, although that is not apparent from our data (see histogram below).

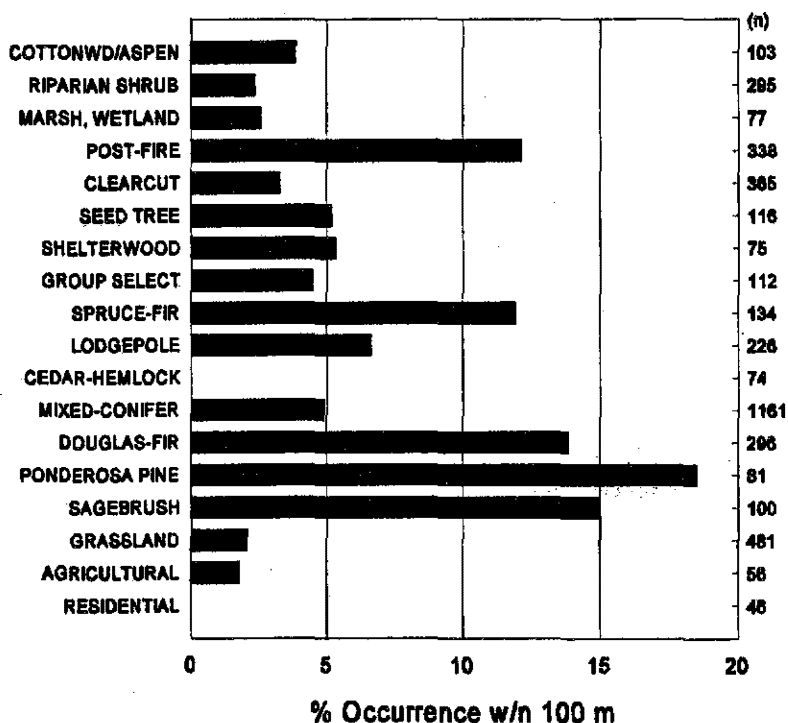
The wide-ranging nature of this species makes it tough to use point-count detections to draw inferences about habitat requirements. Thus, I'll

couple our results with my own field experience to suggest that its needs are closely linked to areas of high conifer seed production, primarily early post-fire habitat.



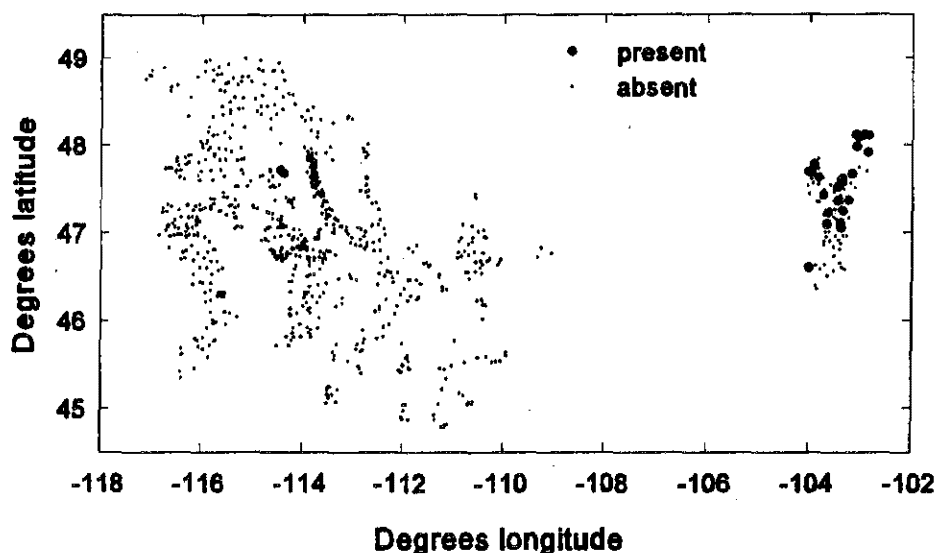
Management Considerations.

Relying to a substantial extent on early post-fire conditions, where they gather seeds, the Clark's Nutcracker is undoubtedly another species that is negatively affected by post-fire salvage cutting.



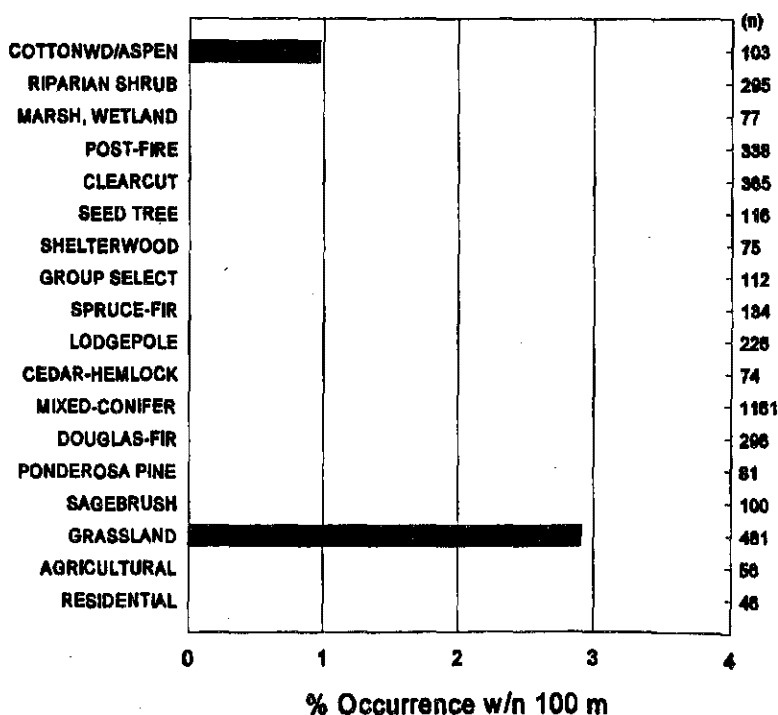
Clay-colored Sparrow

Distribution and habitat use. Clay-colored Sparrows occur throughout the region, although they are much more widespread in the eastern portion (see map at right). They occur in woody draws within grasslands and in riparian bottomland corridors (see histogram below).



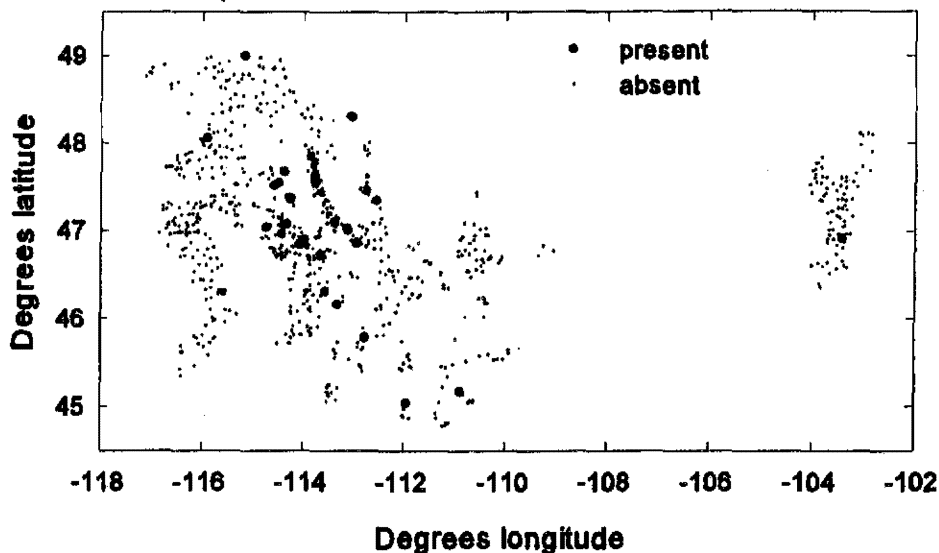
Management Considerations.

This is another "grassland" species that deserves special attention because it occurs virtually nowhere else. The single-most important land-use activity that might have an effect on Clay-colored Sparrows is grazing because of the intense pressure that cattle put on woody draws within open grassland. We cannot speculate on such potential effects until after the 1995 data are incorporated, however.

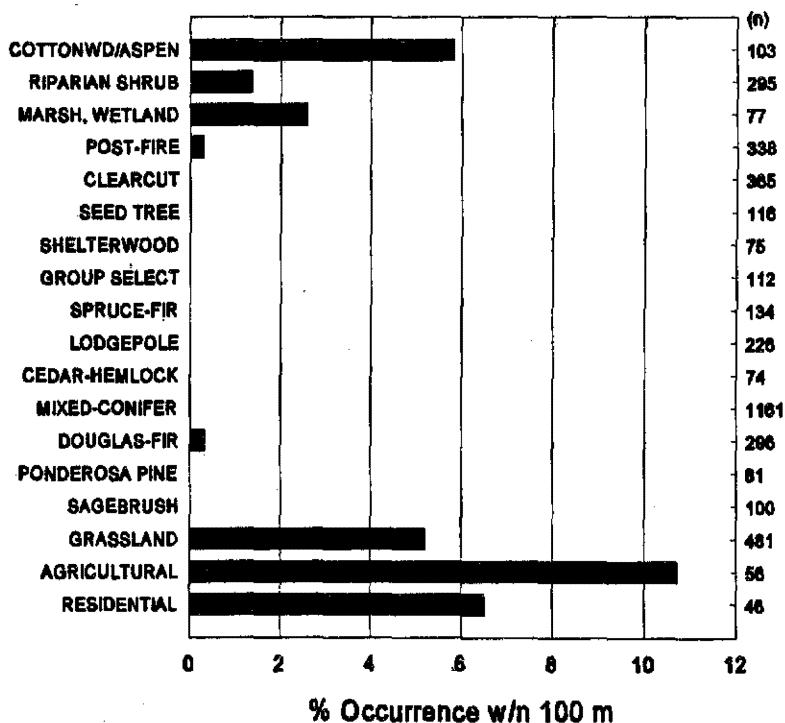


Cliff Swallow

Distribution and habitat use. Cliff Swallows occur throughout the region (see map at right). They are birds of low-elevation, open country adjacent to riparian corridors (see histogram below), where they nest in colonies.

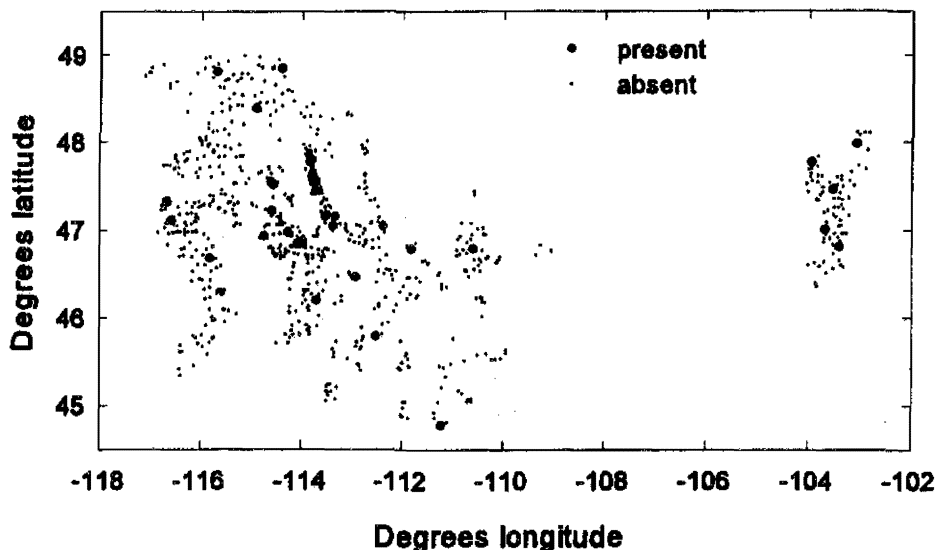


Management Considerations.
None suggested by the data.



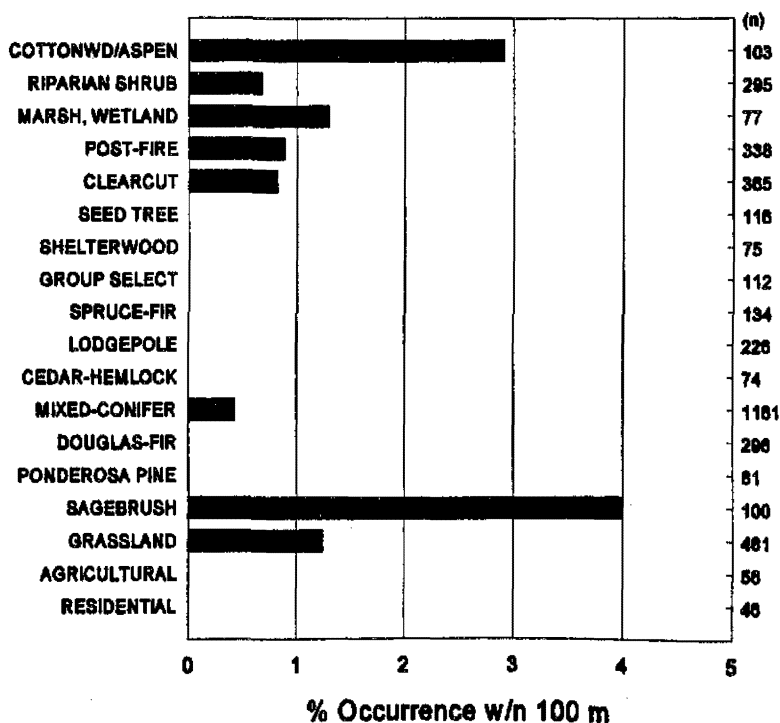
Common Nighthawk

Distribution and habitat use. Common Nighthawks are distributed throughout the region (see map at right). They are a bird of riparian bottomland and adjacent open grasslands and sagebrush (see histogram below). To some extent, they move into the open areas created by fire and clearcutting activity.



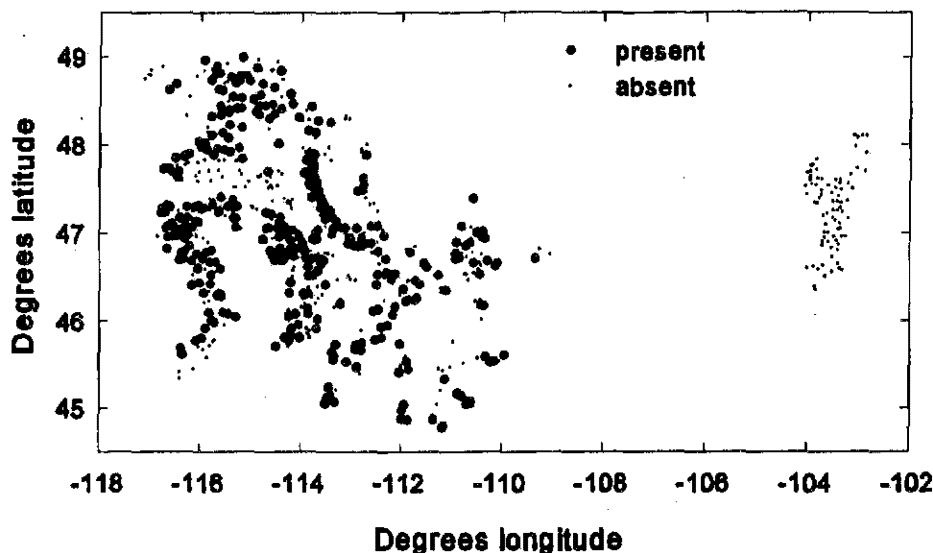
Management Considerations.

None suggested by the distribution data, per se. Nonetheless, its ground-nesting habit, coupled with the fact that it is pretty much restricted to areas frequented by cattle, suggest that we might want to look at nesting success (which may be affected by mechanical damage from cattle).



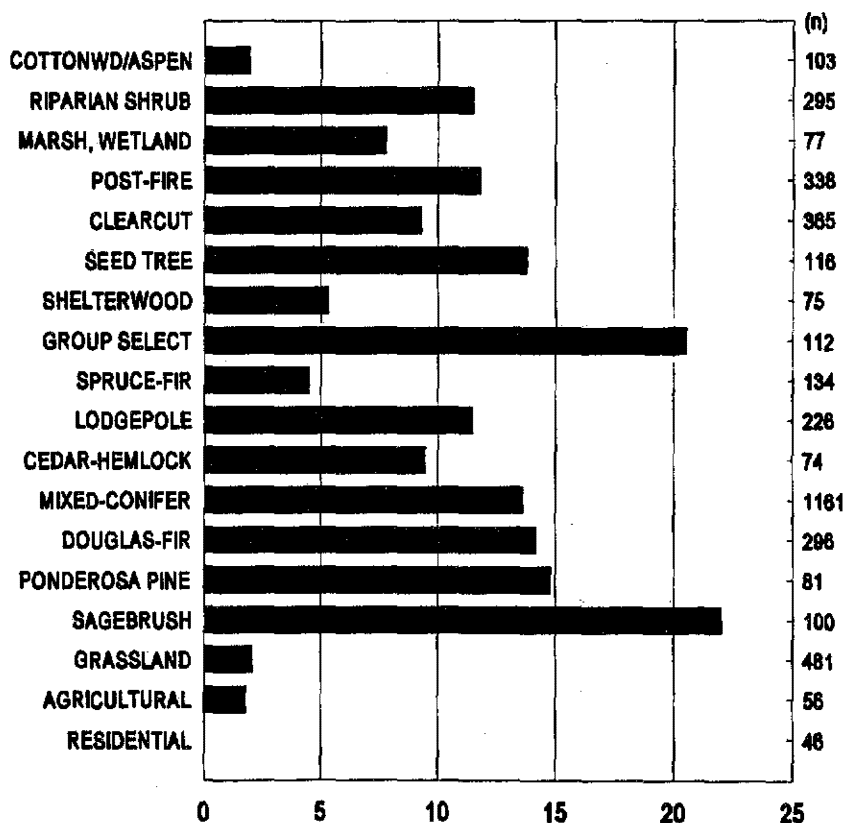
Common Raven

Distribution and habitat use. Common Ravens occur throughout the western portion of the region (see map at right) where they are uniformly abundant across all types of conifer forests (see histogram below). Note the difference between the habitat distribution of this species and the American Crow, which is more closely associated with the non-forested agricultural land.



Management Considerations.

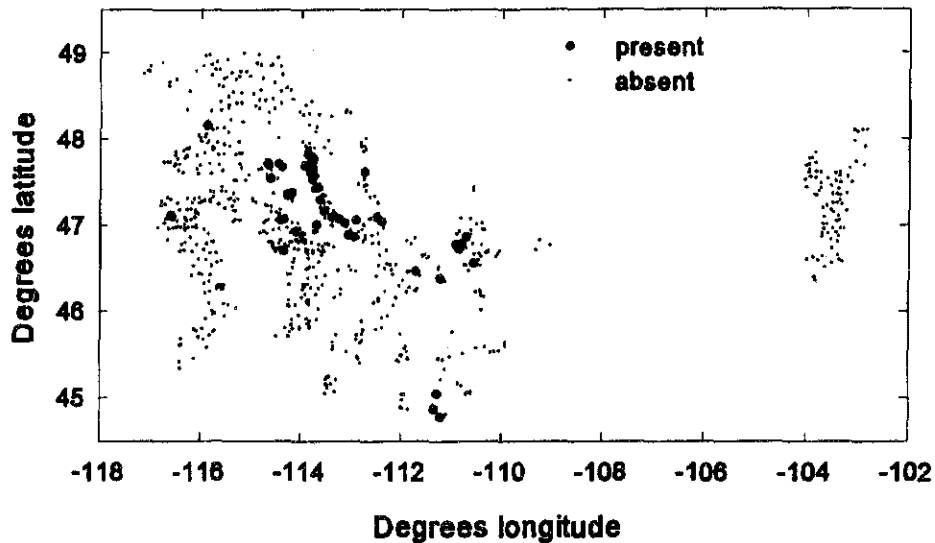
This species is a notable egg predator, but the abundance data do not suggest any special problem associated with land-use practices here in the Northern Rockies.



Common Snipe

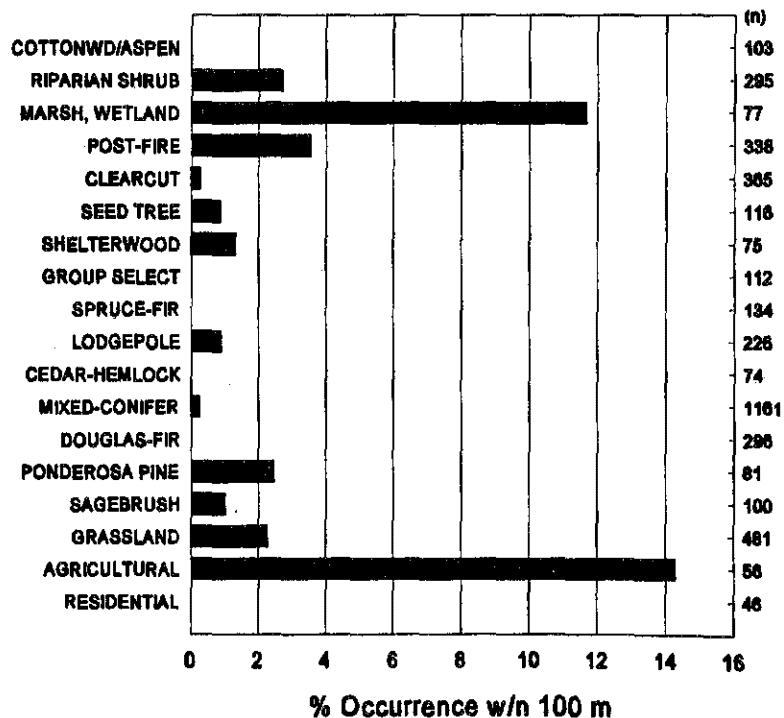
Distribution and habitat use.

The Common Snipe occurs across the region, although we detected it only in the western portion (see map at right). This species is relatively restricted to wetlands and marshes (see histogram below). They often perform their aerial display over irrigated agricultural fields, hence the apparent abundance in agricultural areas.



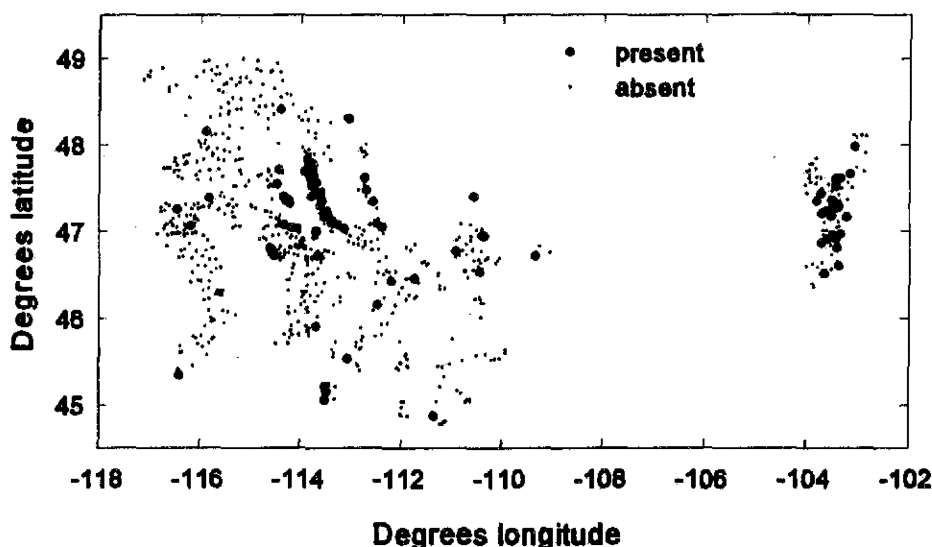
Management Considerations.

None independent of the wholesale conversion of their wetland habitat to agricultural land; without intact wetland areas, they have nothing.

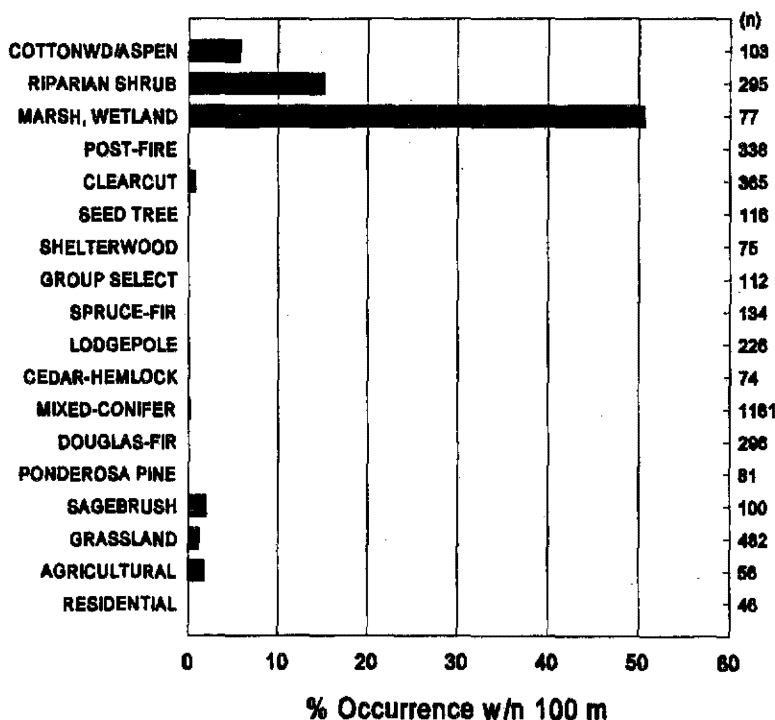


Common Yellowthroat

Distribution and habitat use. Yellowthroats are distributed throughout the region (see map at right), and are restricted to riparian cover types, especially marshes (see histogram below).



Management considerations. Because this species (along with numerous others) is restricted to marshes, willow flats, and the like, the draining of wetlands and the impact of adjacent land-use activity on this wetland-dependent species needs special consideration; without intact wetland areas, they have nothing.

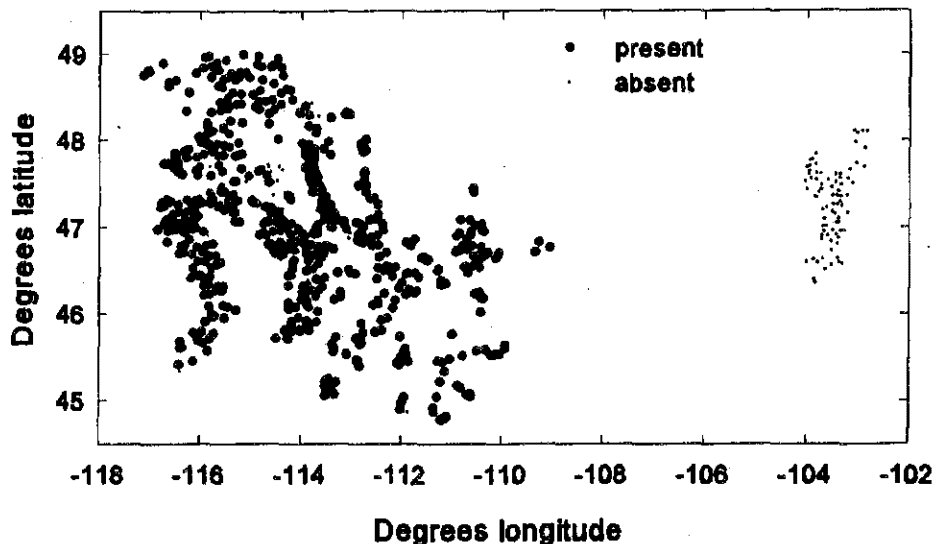


Dark-eyed Junco

Distribution and habitat use.

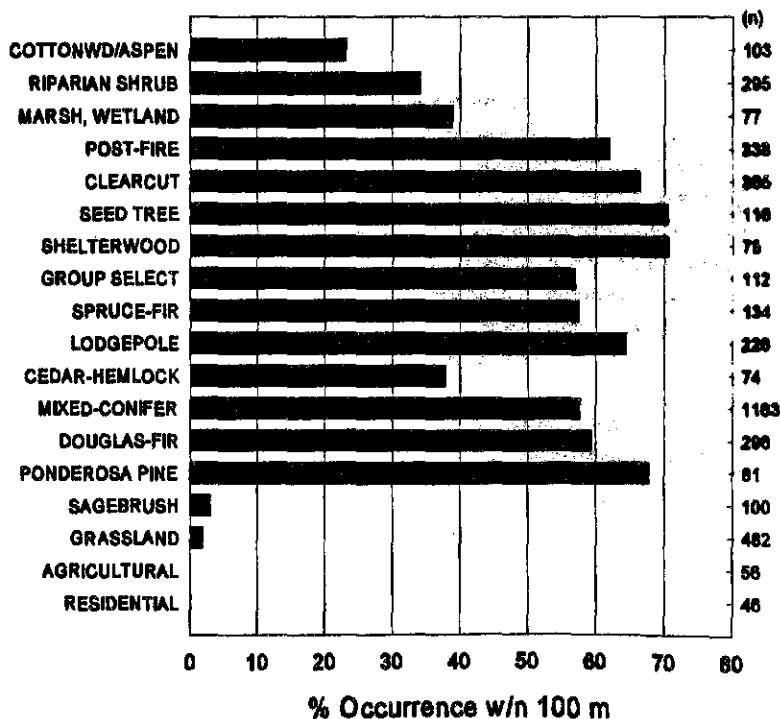
Dark-eyed Juncos occur only in the western part of the region (see map at right), where they are probably the most common songbird species across a wide range of forest cover types (see histogram below). They nest on the ground, often beneath downed logs, so it is not surprising that they are three times more likely to occur on points with an abundance of dead and

down (57.9% occurrence) than on points without any dead and down nearby (18.8% occurrence).



Management considerations.

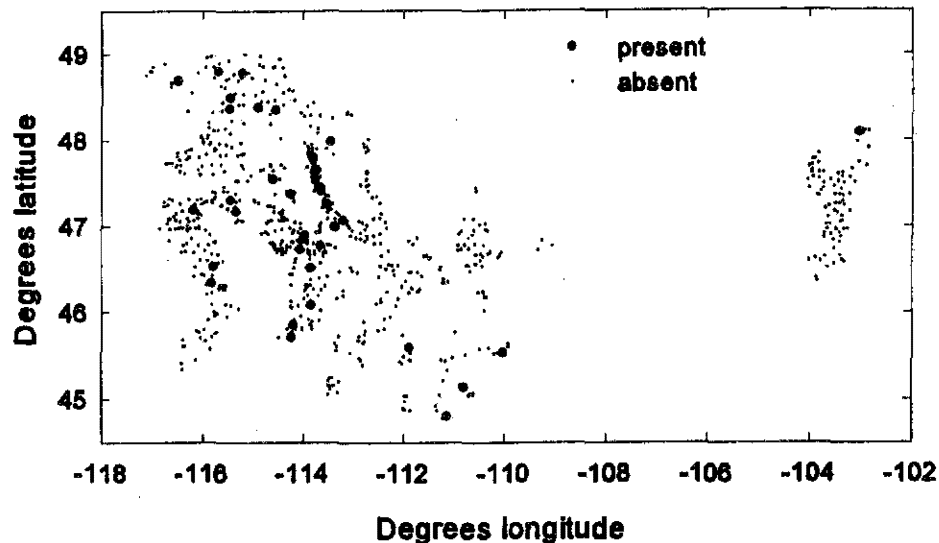
There would not seem to be much to worry about with a species as widespread and common as this one. Nonetheless, maintaining the dead-and-down component in harvested areas may be helpful to this species.



Downy Woodpecker

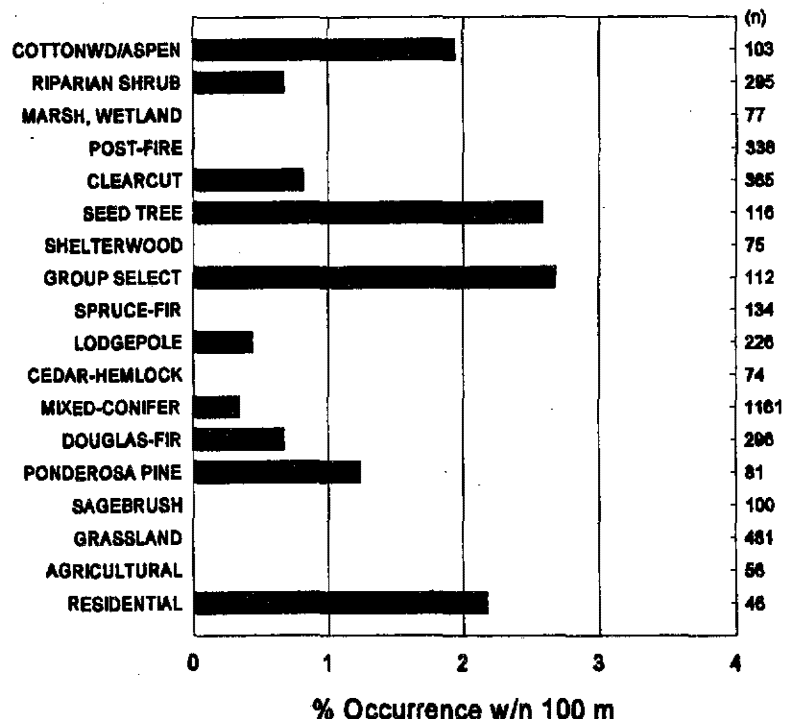
Distribution and habitat use.

Downy Woodpeckers are distributed throughout the region (see map at right). My experience shows them to be relatively restricted to riparian bottomlands during the breeding season, so why did we record them in so many other cover types (see histogram below)? My guess is that many of the observers misidentified the birds when they were detected by calls or drumming patterns alone; even birds that are observed are frequently misidentified as Hairy Woodpeckers. There is simply no way that this species is most common in group selection cuts and seed tree cuts!



Management Considerations.

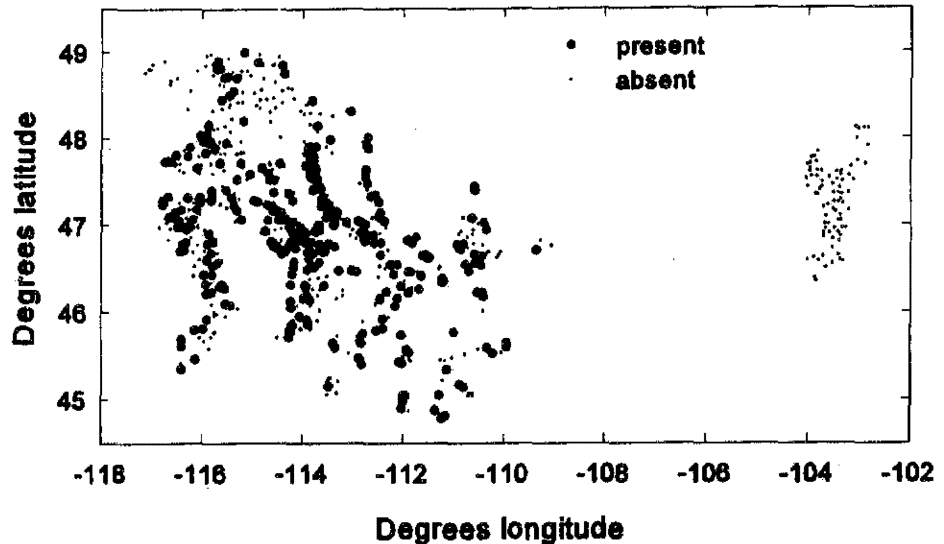
None suggested by the data.



Dusky Flycatcher

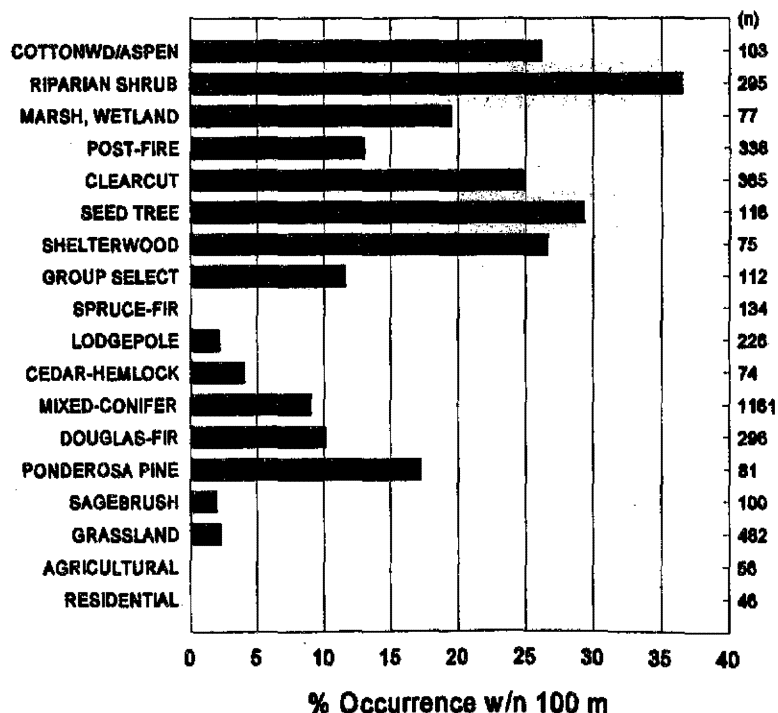
Distribution and habitat use. Dusky Flycatchers are restricted to the western portion of the region (see map), where they occur primarily in early successional forests that contain a good shrub layer. Those habitat conditions are naturally provided in post-fire forests, but cut forests seem to provide suitable conditions as well (see histogram). The apparent abundance of

Dusky Flycatchers in the streamside shrub cover type is probably a product of misidentification of this hard-to-identify *Empidonax* species. My experience suggests that this bird occurs much less commonly in streamside shrub than in forest shrub situations.



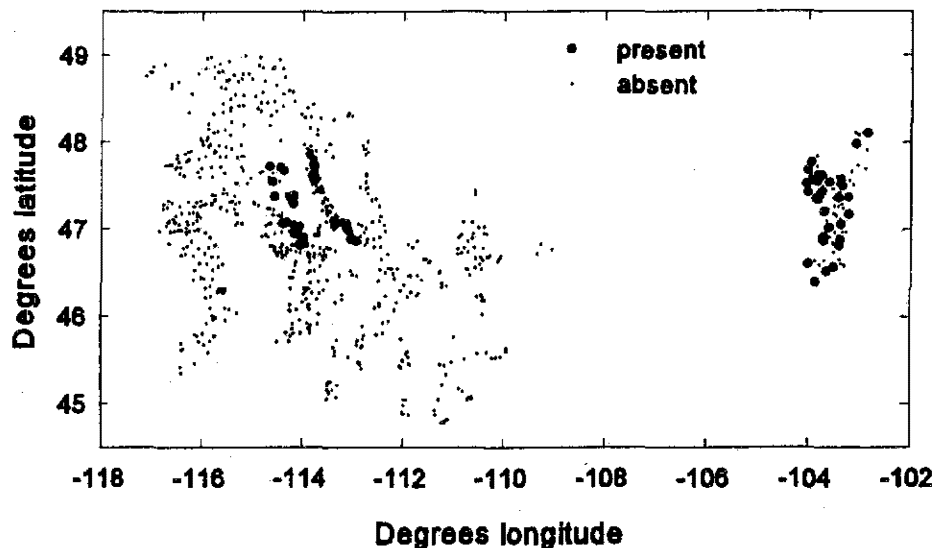
Management Considerations.

My guess is that this species is more common now than in the historical past because of forest cutting practices. The possibility that we are creating "ecological traps" by pulling them into artificially created situations (cut forests) where they do poorly is unlikely, but certainly possible; the issue merits study.

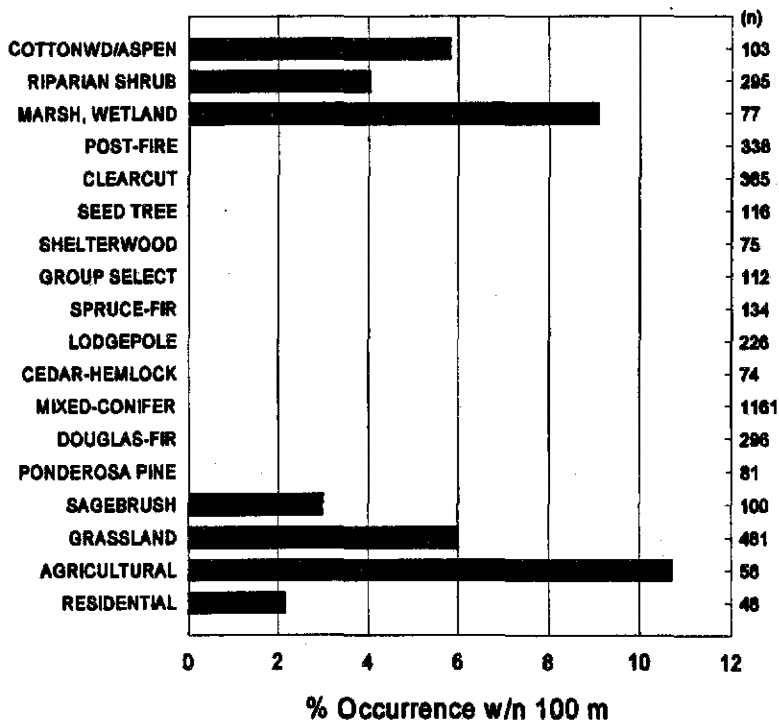


Eastern Kingbird

Distribution and habitat use. Eastern Kingbirds occur throughout the region (see map) in riparian bottomlands and adjacent agricultural areas (see histogram).

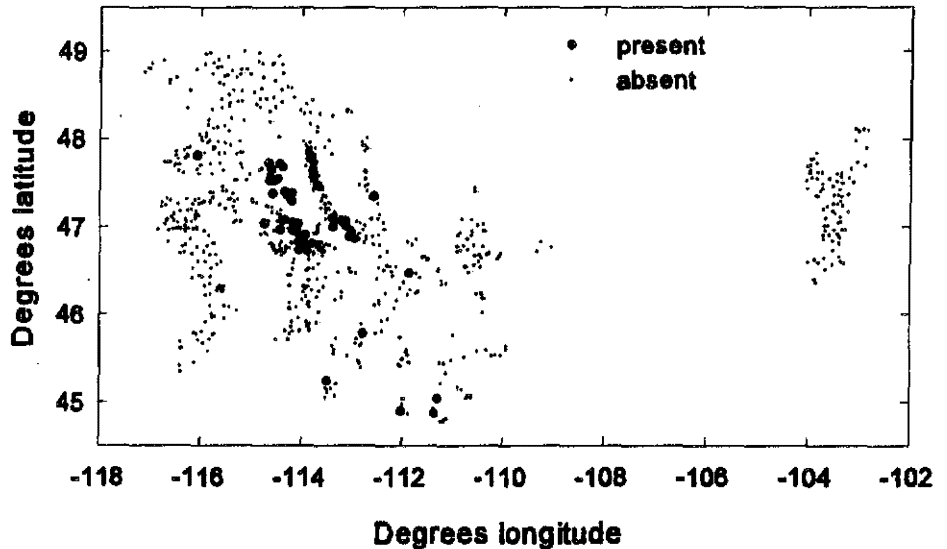


Management Considerations.
None suggested by the data.



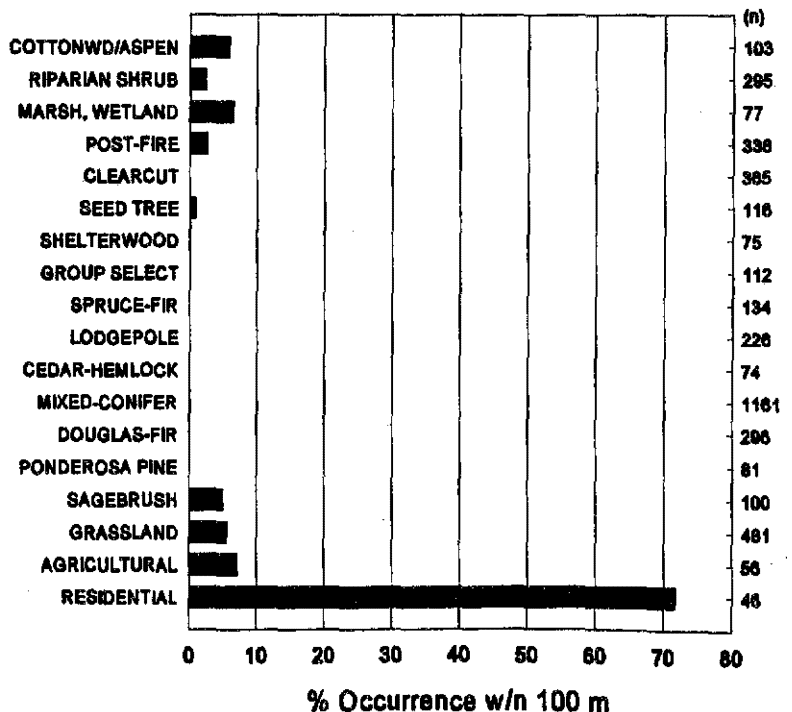
European Starling

Distribution and habitat use. The European Starling is a non-native species that now occurs throughout the region (see map), where they are relatively restricted to urban residential areas and rural residential areas associated with agriculture and river bottomland (see histogram).



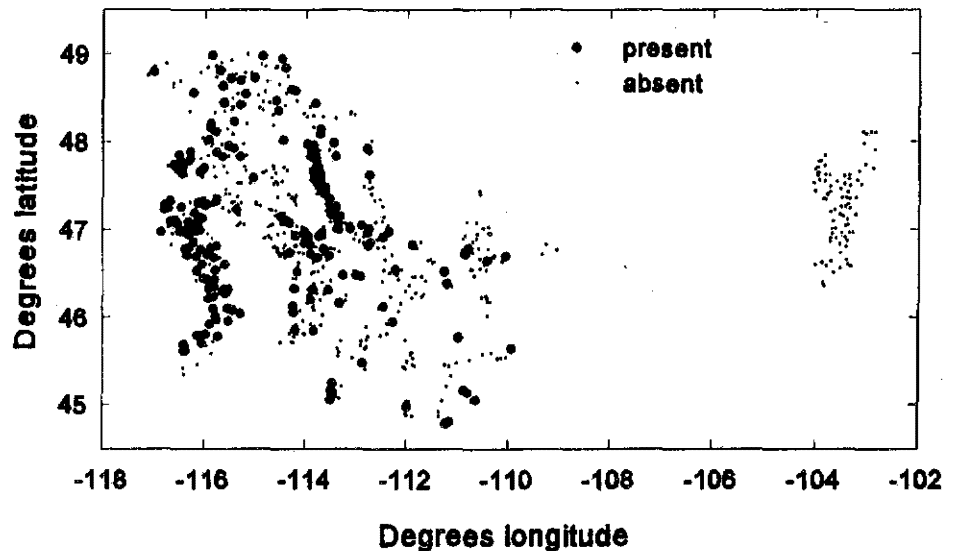
Management Considerations.

Starlings are aggressive at displacing native species from nest cavities, but pose no special threat to forest birds in general because they are relatively restricted to areas associated with human activity. However, their presence in virtually all cottonwood bottomlands (as a result of human activity there) may pose a special threat to cavity nesting birds that are relatively restricted to that cover type (e.g., Tree Swallow and House Wren).

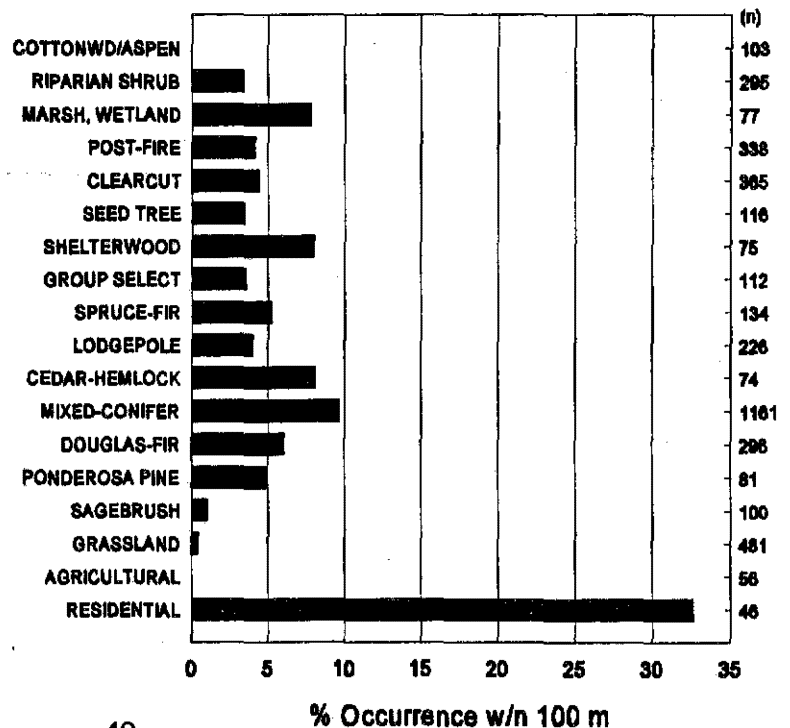


Evening Grosbeak

Distribution and habitat use. Evening Grosbeaks occur throughout the western portion of the region (see map). They are fairly uniformly distributed across all the conifer forest types (see histogram). The relative abundance in residential areas is an artifact of early season data; they occur commonly in cities during migratory passage, which occurs relatively late each season.

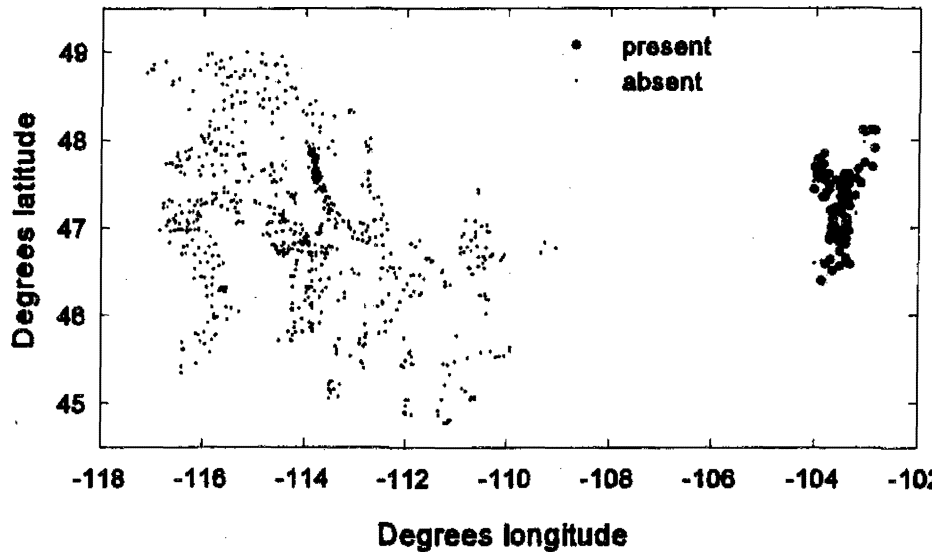


Management Considerations.
None suggested by the data.



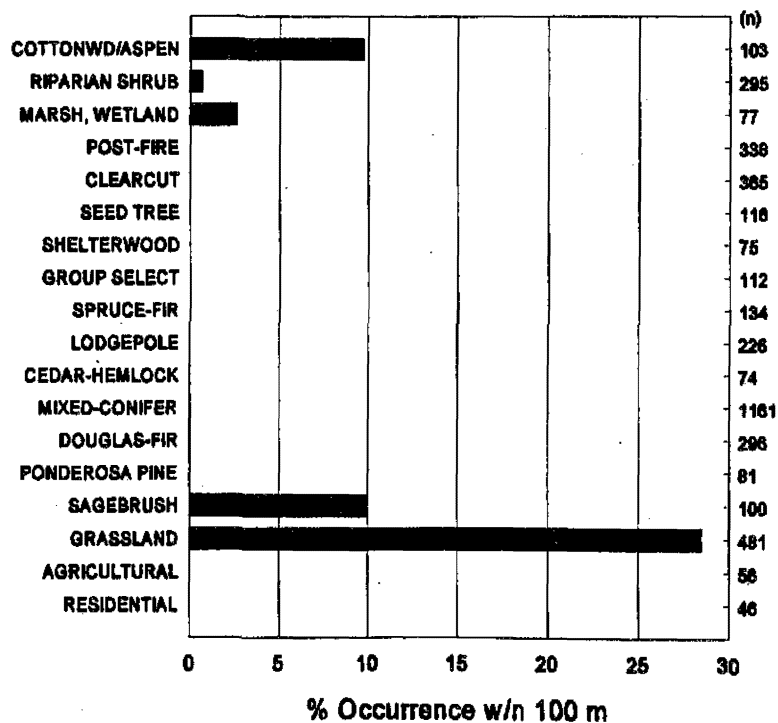
Field Sparrow

Distribution and habitat use. Field Sparrows are restricted to the eastern portion of the region (see map to right), where they occur in mixed grassland and shrubland (see histogram below).



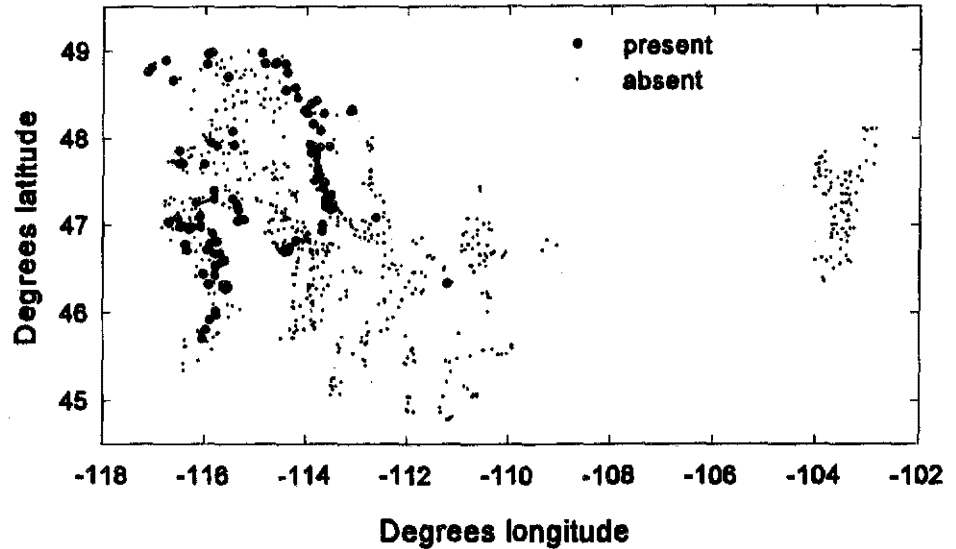
Management Considerations.

The single-most important land-use activity that might have an effect on Field Sparrows is grazing because of the intense pressure that cattle put on the habitat types that this species is restricted to. I will look for the presence of such effects after the 1995 data are incorporated.

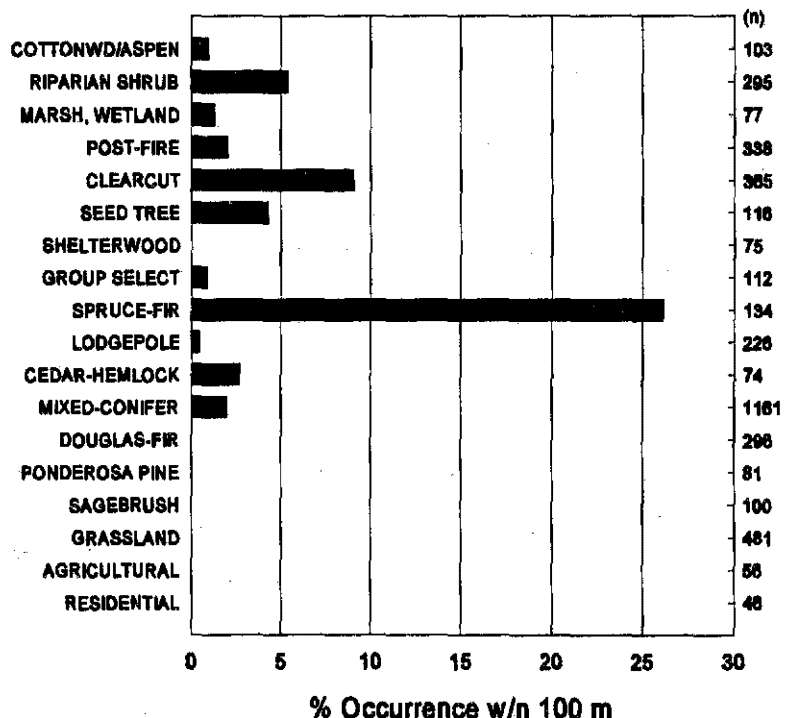


Fox Sparrow

Distribution and habitat use. Fox Sparrows are restricted to the northwestern portion of the region (see map to right). They are the only species for which we have the data that shows a relative restriction to higher elevation spruce-fir forests (see histogram below). They are three times more likely to occur on points with and abundance of snags and dead/down.



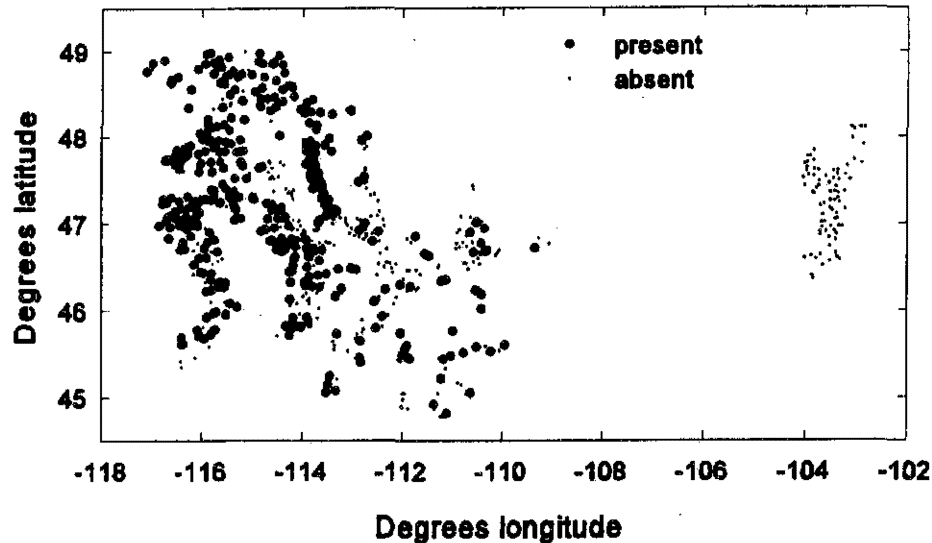
Management Considerations. Because of its uniquely restricted habitat distribution pattern, this species might be a good one to use as an indicator of conditions in the spruce-fir zone.



Golden-crowned Kinglet

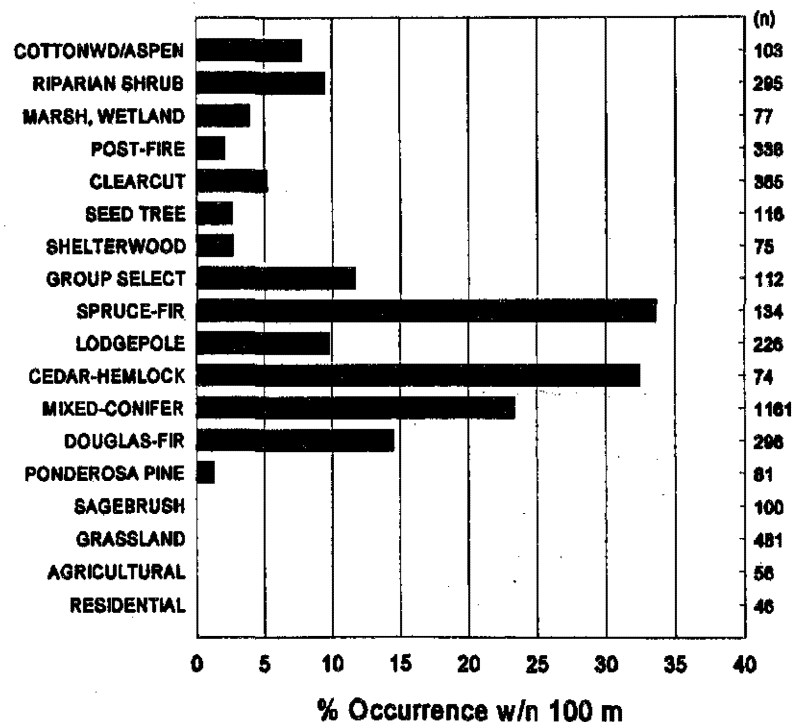
Distribution and habitat use.

Golden-crowned Kinglets are restricted to the western part of the region (see map at right). They are also nearly restricted to uncut forest types, especially cedar-hemlock and spruce-fir forests (see histogram below). This dependence on relatively uncut forests is also reflected in the fact that they are significantly ($P < 0.001$) more likely to occur on points with an abundance of snags (26.2% occurrence) and dead/down (22.3%) nearby vs. points without any snags (8.9%) or dead/down (3.1%) nearby. They are also less likely to occur on points near than far from roads and edges.



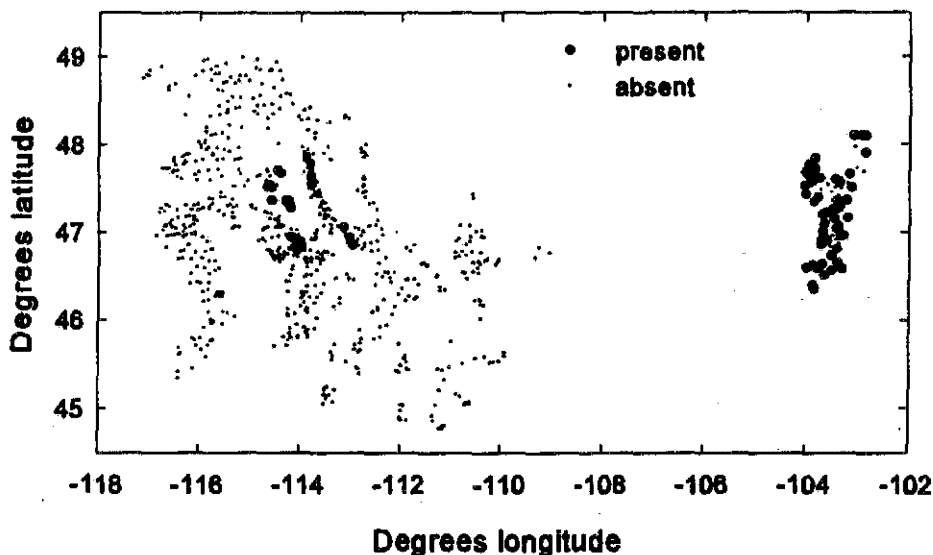
Management considerations.

Golden-crowned Kinglets clearly depend on relatively uncut forest conditions. Maintenance of their populations will probably necessitate maintenance of larger tracts of older forest. The species is not currently in trouble, so there's a chance to do some proactive landscape management here.



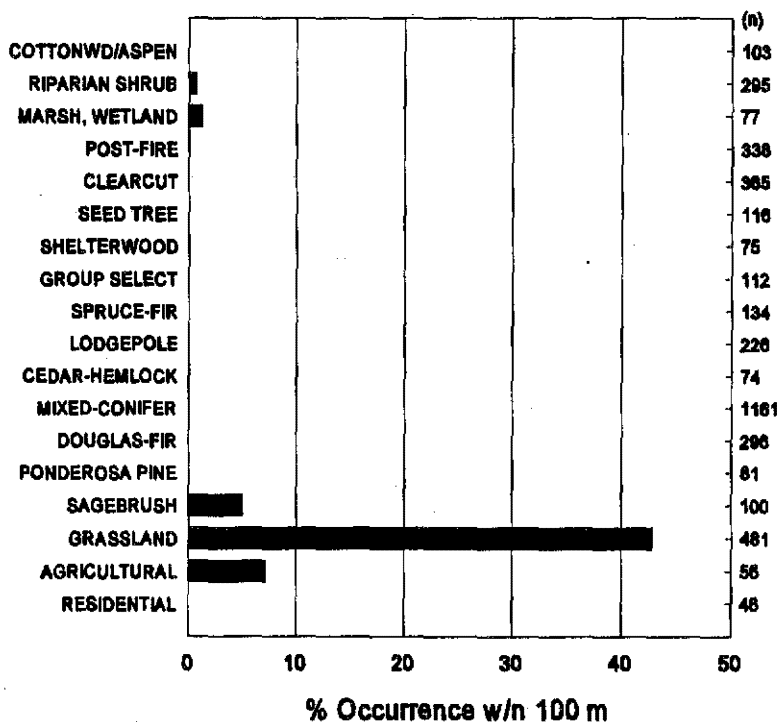
Grasshopper Sparrow

Distribution and habitat use. Grasshopper Sparrows are uniformly widespread in the eastern part of the region, and occur regularly in lower elevations throughout the western part of the region (see map at right). This species is clearly tied to grasslands (see histogram below).



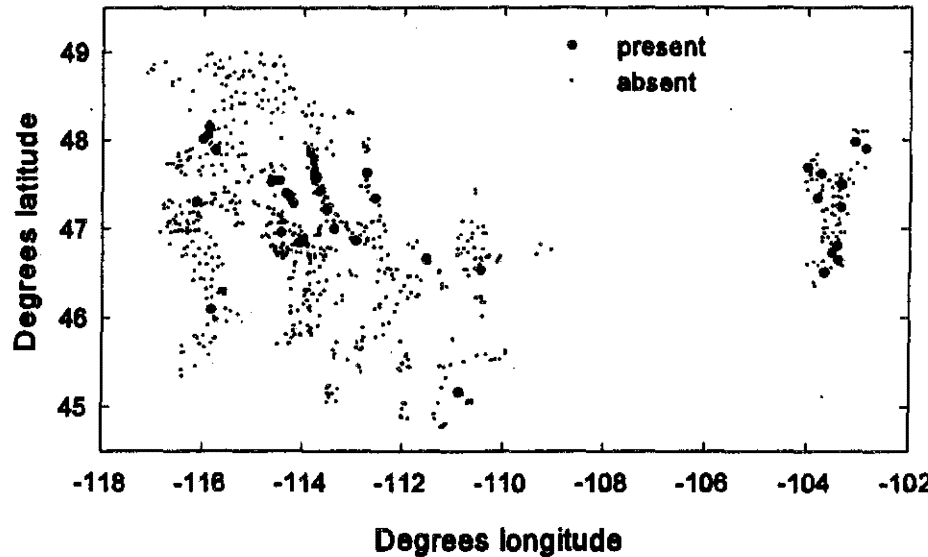
Management considerations.

As with the other grassland-dependent species, Grasshopper Sparrows have been experiencing population declines probably largely because of the conversion of land for agricultural purposes. We'll be able to comment on grazing effects after we incorporate the 1995 data.

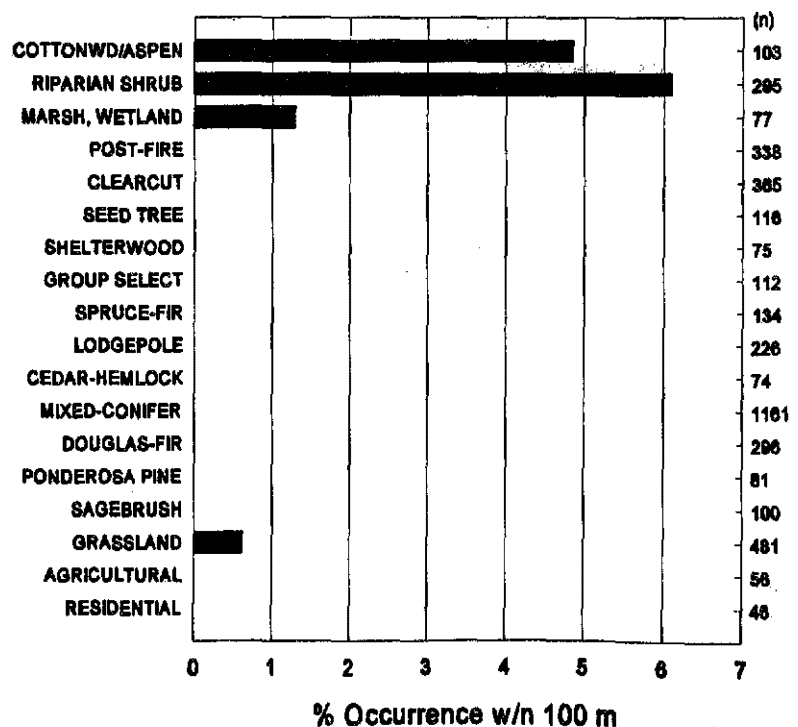


Gray Catbird

Distribution and habitat use. Catbirds are distributed throughout the region (see map to right), where they are restricted to riparian bottomlands and lowland streamside shrublands (see histogram below).

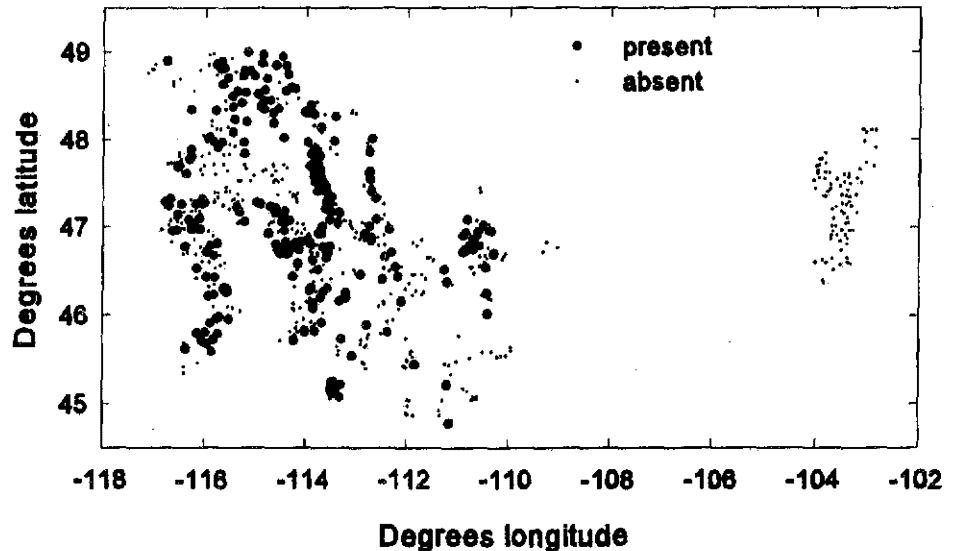


Management Considerations. This is another riparian-dependent species that could be affected by streamside management, especially grazing practices. Negative effects could be felt through mechanical damage to nests by cattle, and by nest parasitism by Brown-headed Cowbirds.



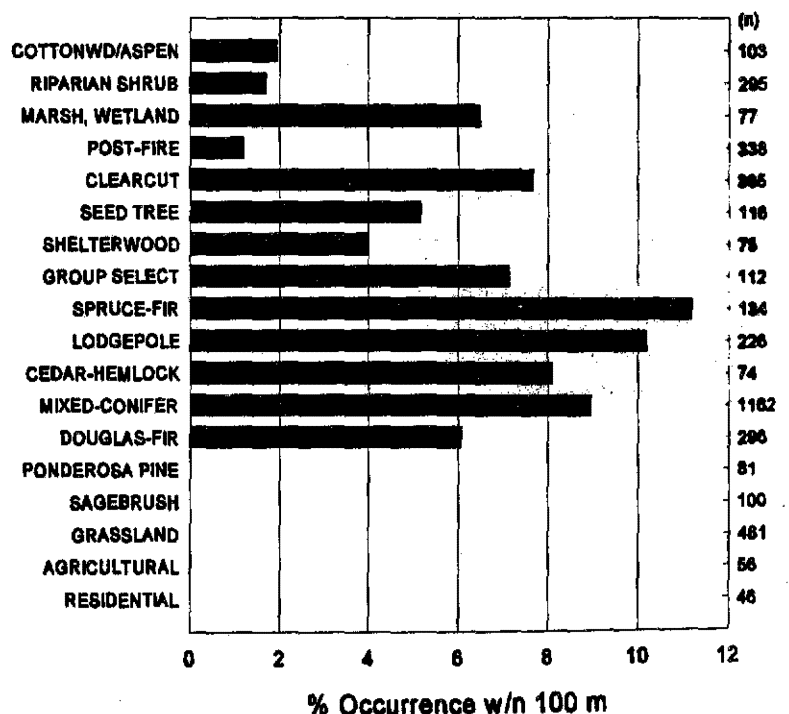
Gray Jay

Distribution and habitat use. Gray Jays are restricted to the western portion of the region (see map to right), where they occur in higher elevation, relatively undisturbed conifer forests (see histogram below).



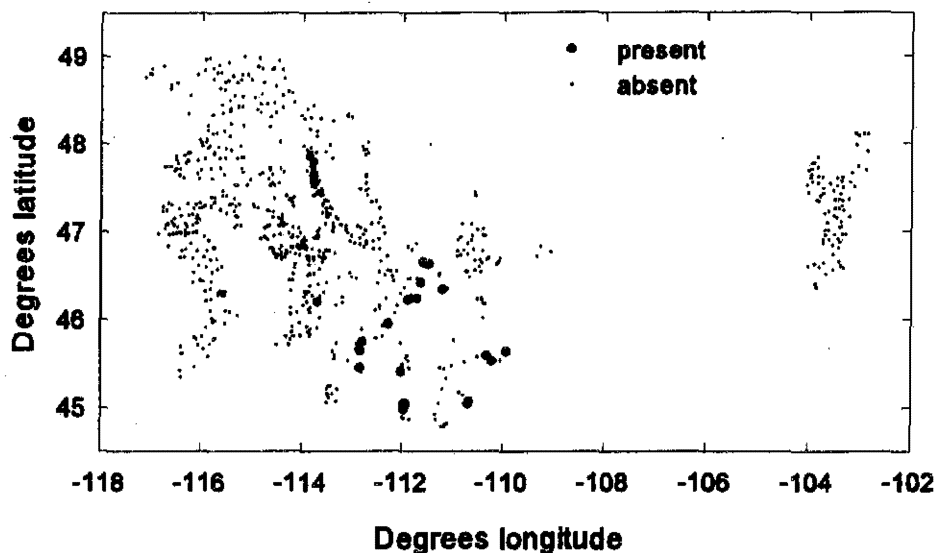
Management Considerations.

Although Gray Jays occur in cut as well as uncut conifer forest types, it is uniformly less abundant in the cut forest types, which suggests that it may need older, relatively closed-canopy forests for population maintenance.

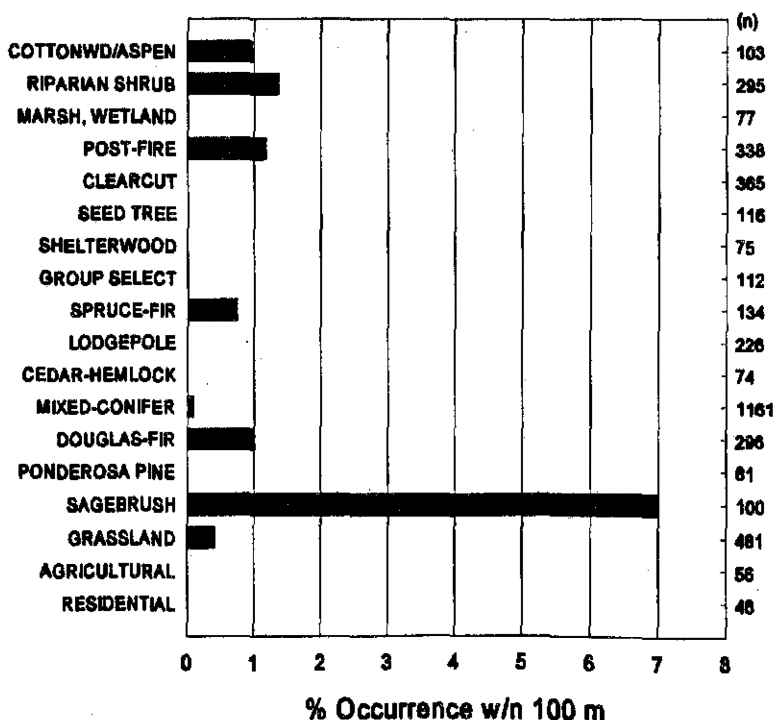


Green-tailed Towhee

Distribution and habitat use. Green-tailed Towhees are restricted to the southwest-central portion of the region (see map to right). They are relatively restricted to sagebrush habitats (see histogram below), but also occur in higher elevation shrubby second-growth after fire and other disturbance.

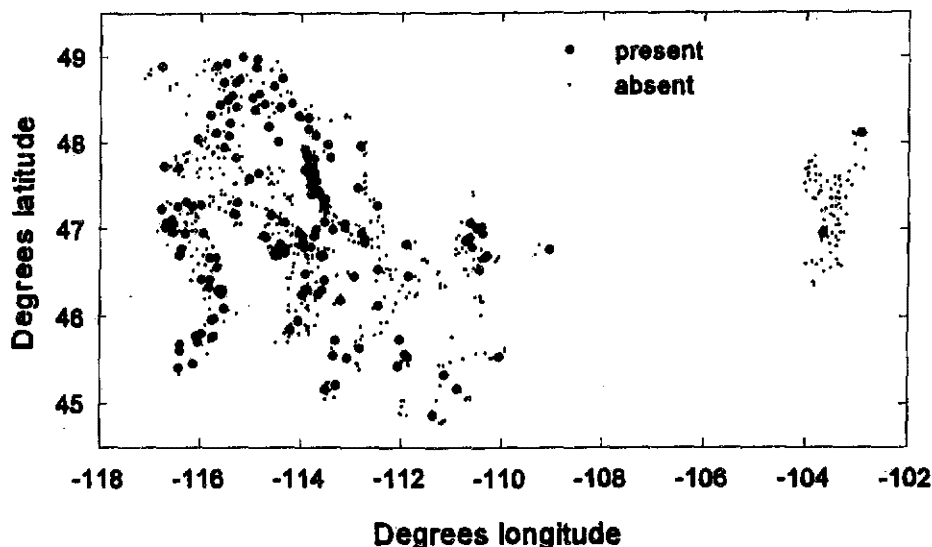


Management Considerations.
None suggested by the data.



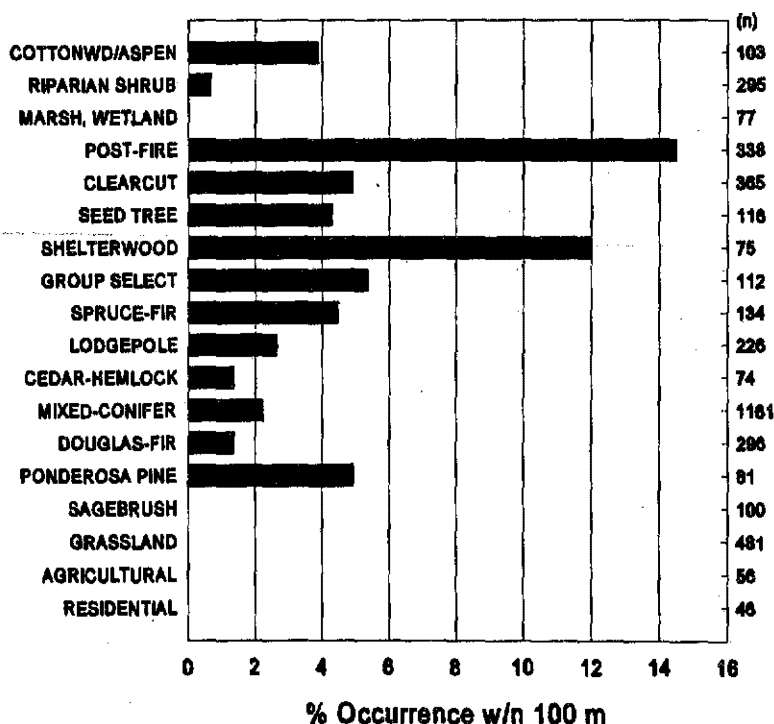
Hairy Woodpecker

Distribution and habitat use. Hairy Woodpeckers occur throughout the region, although they appear to be more widespread in the western portion (see map to right). They occur fairly uniformly across most conifer forest types, and are generally more abundant in cut than in uncut forests (see histogram below). The most notable aspect of their habitat distribution is the relative abundance in early post-fire forests. This result is consistent with findings based on my synthesis of published census data (Hutto 1995, Conservation Biology 9:1041-1058).



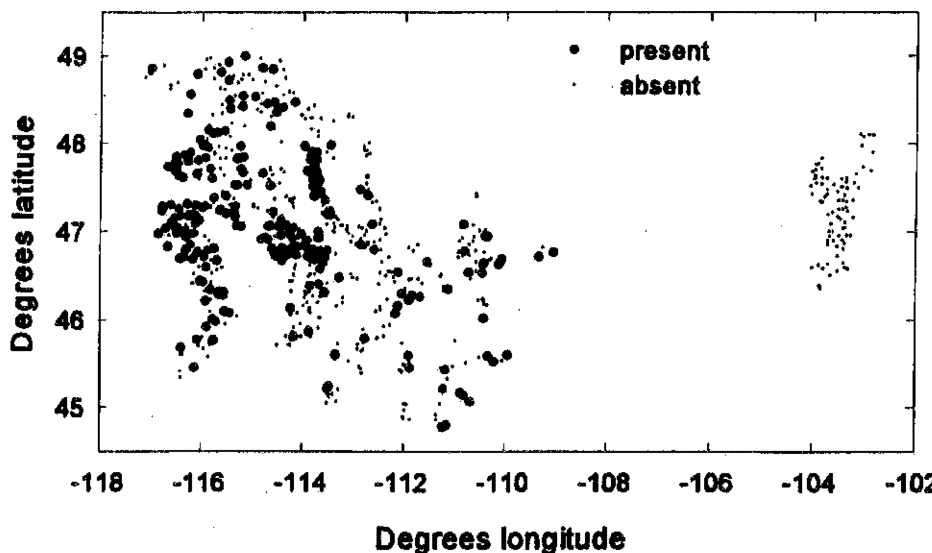
Management Considerations.

Two things are suggested by the habitat distribution data: (1) post-fire, standing dead forests are important to this species, and (2) the relative abundance in shelterwood cuts may be an indication that Hairy Woodpeckers are being drawn into such forests because of their superficial similarity to burned forests--whether they do well in the artificially created shelterwood situations or not is unknown. If not, then that (and possibly other cut forests) may be acting as an "ecological trap".

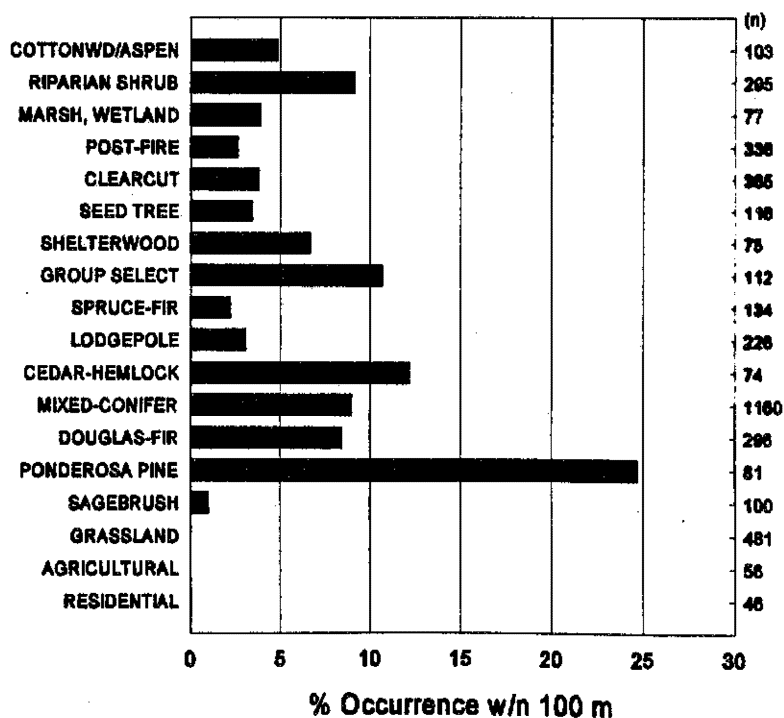


Hammond's Flycatcher

Distribution and habitat use. Hammond's Flycatcher is restricted to the western portion of the region (see map to right), where it occurs in relatively uncut conifer forests (see histogram below).

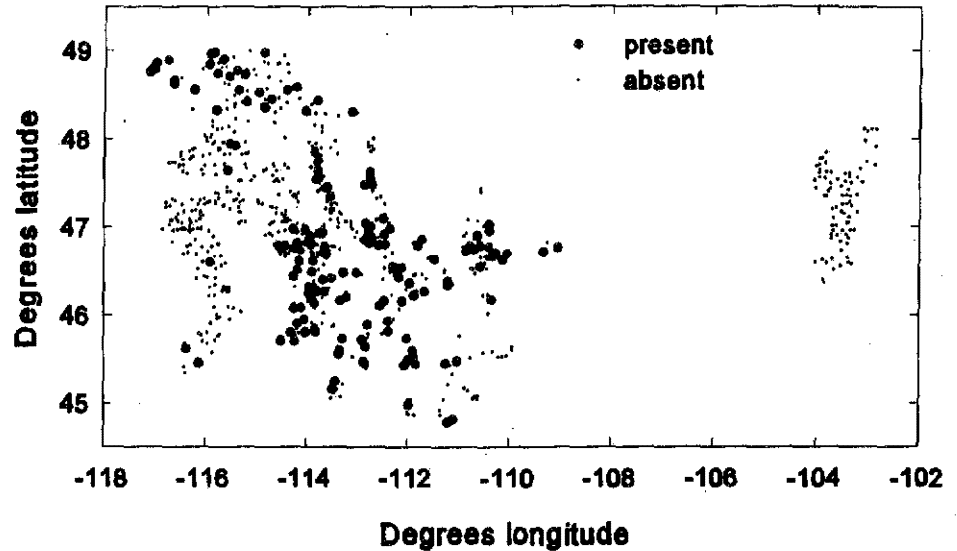


Management Considerations. Although not restricted to the "uncut" conifer forest types, Hammond's Flycatchers are evidently relatively restricted to such. Thus, if suitability is reflected in occurrence data, we need to retain older, uncut forest patches to provide for the needs of this species.



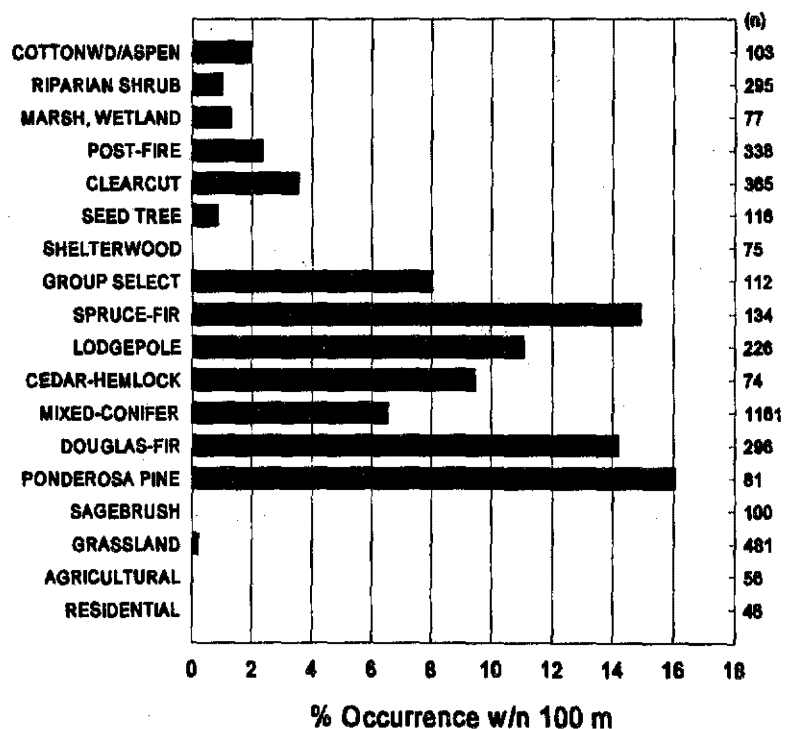
Hermit Thrush

Distribution and habitat use. Hermit Thrushes are restricted to the western portion of the region (see map to right). Their habitat distribution pattern suggests a clear association with relatively uncut forests (see histogram below). They are roughly two times less likely to occur on points that had riparian areas within 100 m, implying an association with relatively dry conditions.



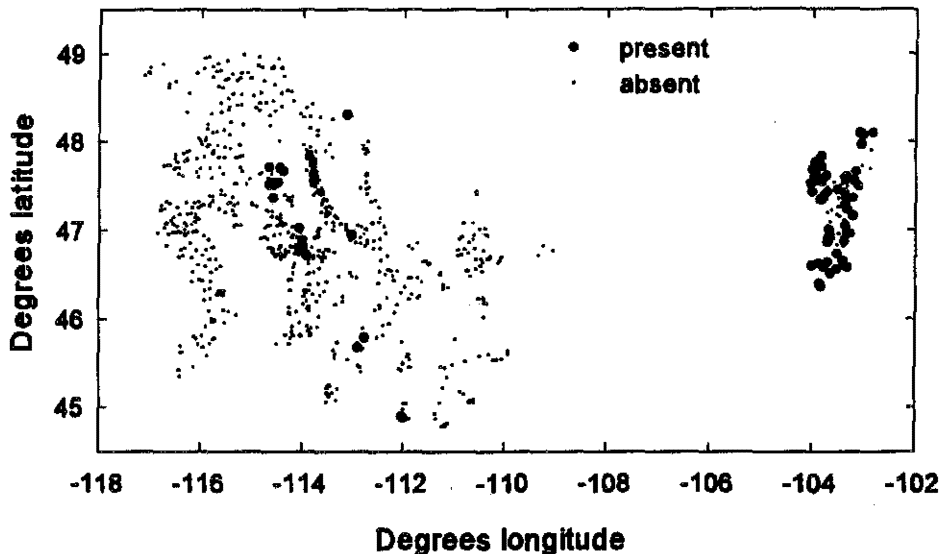
Management Considerations.

This species appears to be relatively sensitive to cutting. It is also one that is declining throughout the West, according to the Breeding Bird Survey data.

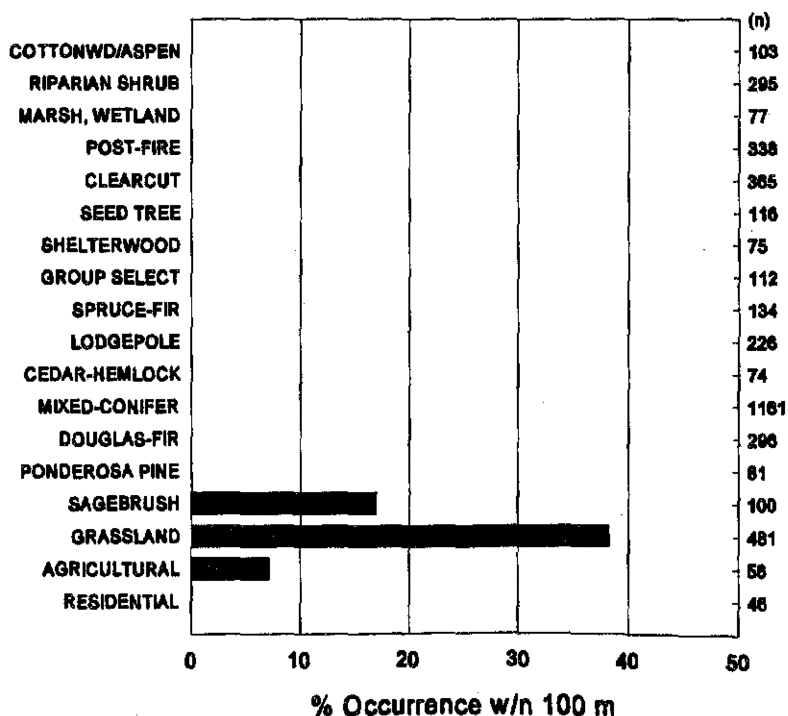


Horned Lark

Distribution and habitat use. Horned Larks are distributed throughout the region, but are especially widespread in the eastern portion (see map to right). They are restricted to short grassland and agricultural areas (see histogram below).

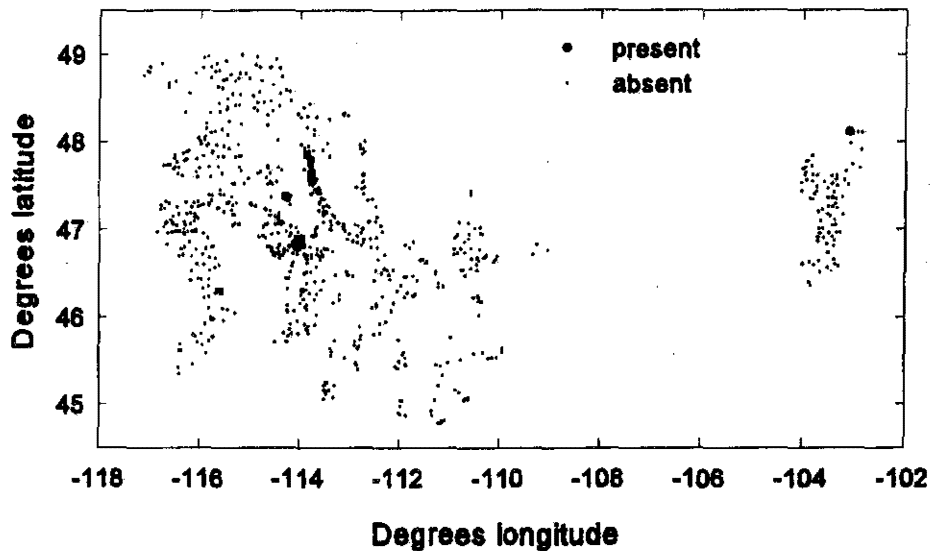


Management Considerations. Because of its relative restriction to the cover types most heavily influenced by cattle grazing, (grasslands, sagebrush and other agricultural areas), we need information on the nest success of this species in relatively grazed and relatively ungrazed situations.

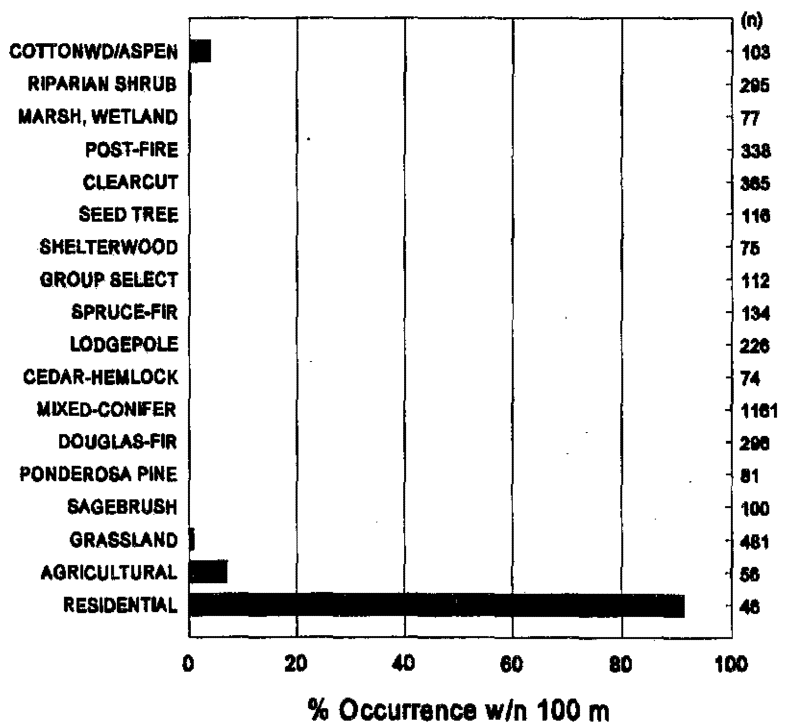


House Finch

Distribution and habitat use. House Finches are restricted to the western portion of the region (see map to right), where they are relatively restricted to residential areas (see histogram below).

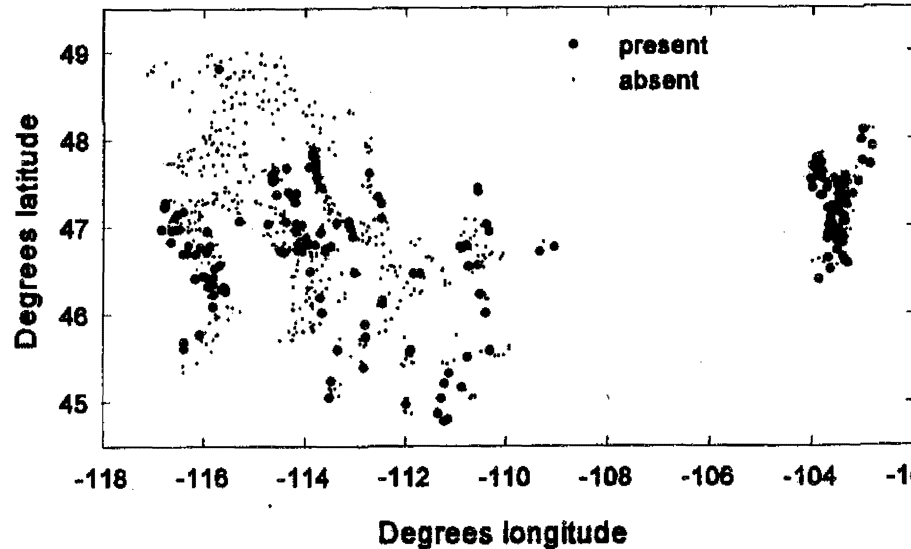


Management Considerations.
None suggested by the data.



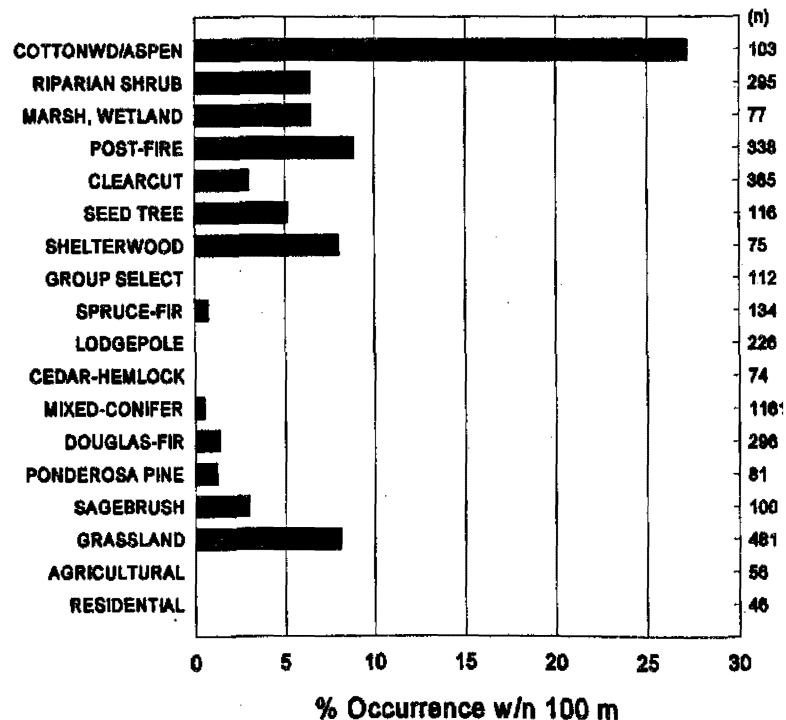
House Wren

Distribution and habitat use. House Wrens occur throughout the region (see map to right). They occur primarily in riparian bottomlands, but are also common in a variety of cut conifer forest types (see histogram below).



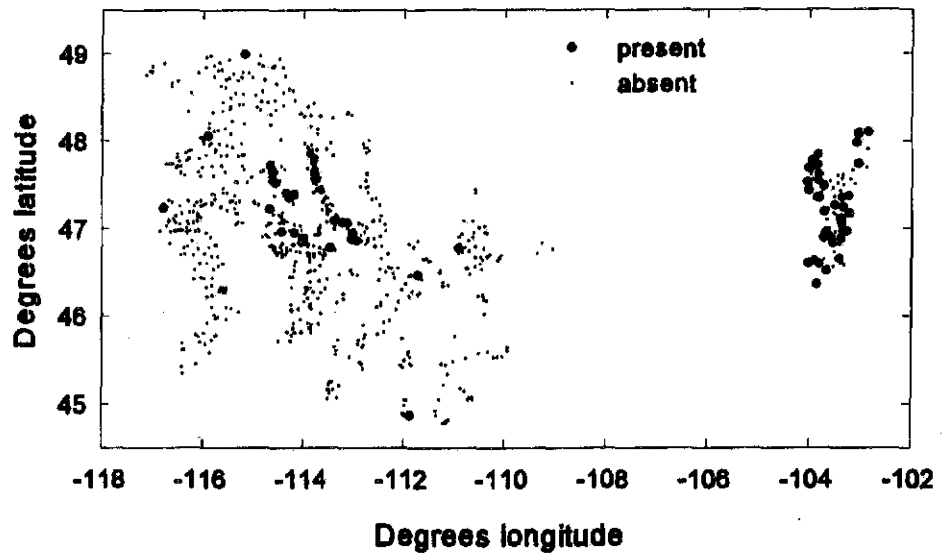
Management Considerations.

Even though the occurrence of House Wrens in harvested forests is some three times less frequent than in riparian bottomlands, the land area covered by cut forests is substantially greater. Thus, if cut forests are acting as "ecological traps" by having the appropriate superficial characteristics but being otherwise unsuitable, there is potential for a serious negative impact of cutting on this species. There is also the issue of nest usurpation by European Starlings in the bottomlands themselves. Finally, House Wrens are susceptible to nest-site loss from salvage cutting in their second-most frequently used cover type (post-fire forests).

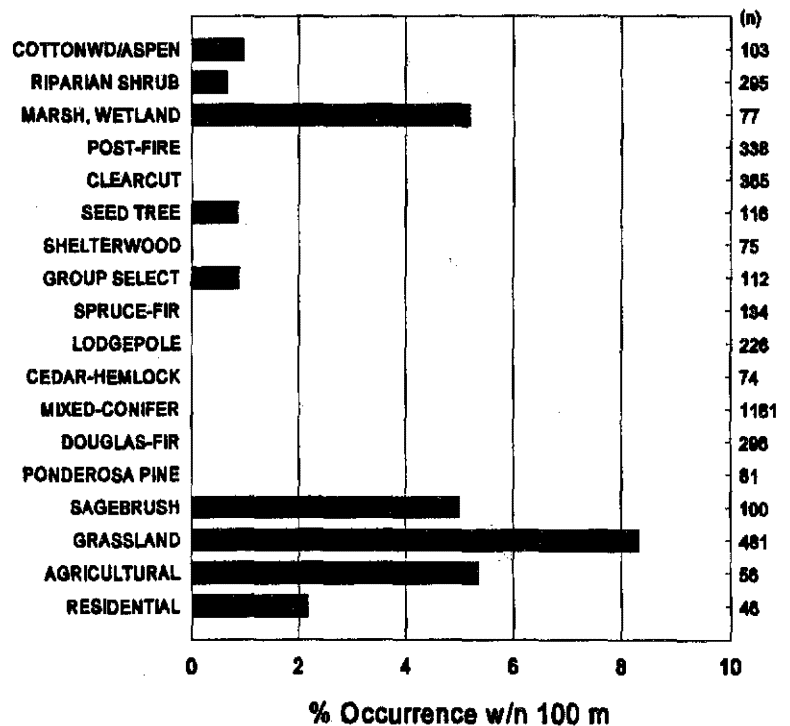


Killdeer

Distribution and habitat use. Killdeer are distributed throughout the region (see map to right), where they occur in open country both in association with and away from human influence (see histogram below).

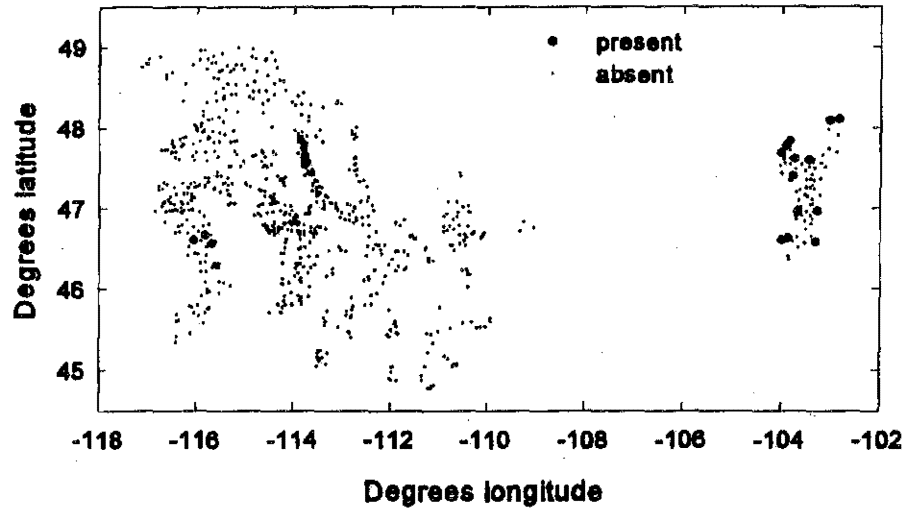


Management Considerations.
None suggested by the data.

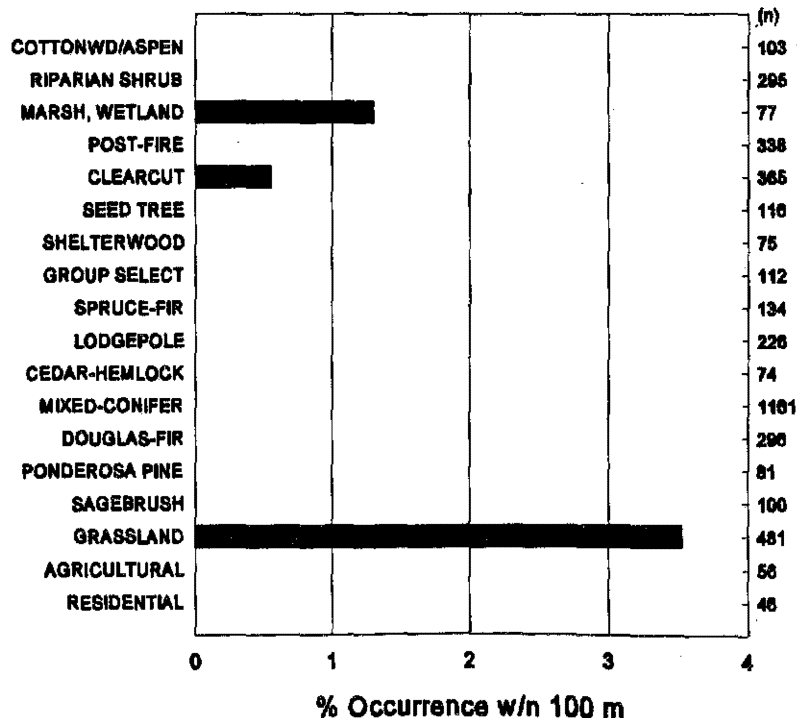


Lark Bunting

Distribution and habitat use. Lark Buntings are restricted to the eastern portion of the region (see map at right), where they occur almost exclusively in grasslands (see histogram below).

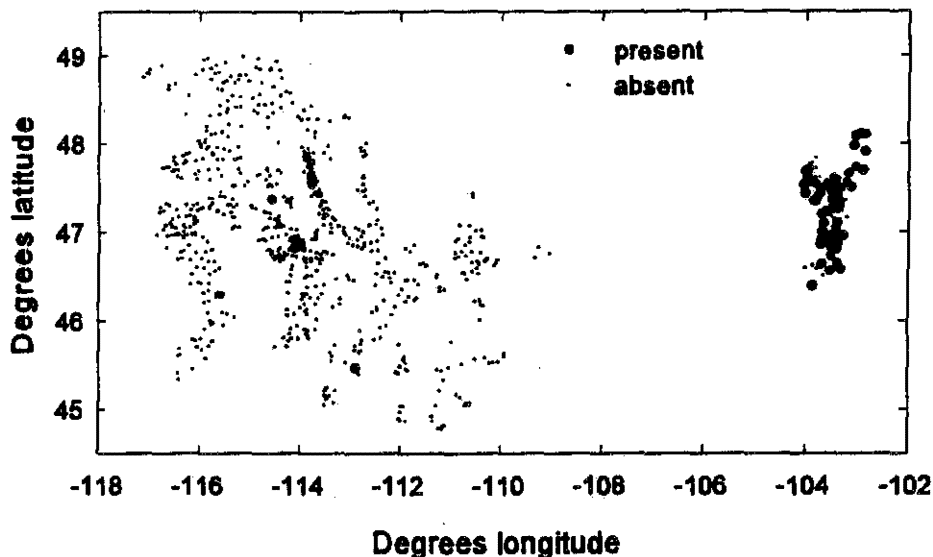


Management Considerations. As is the case with other grassland specialists, we need information on the effect of alternative grassland management practices on the occurrence and breeding success of Lark Buntings. If our land-use practices affect them negatively, there's nowhere else for them to go.



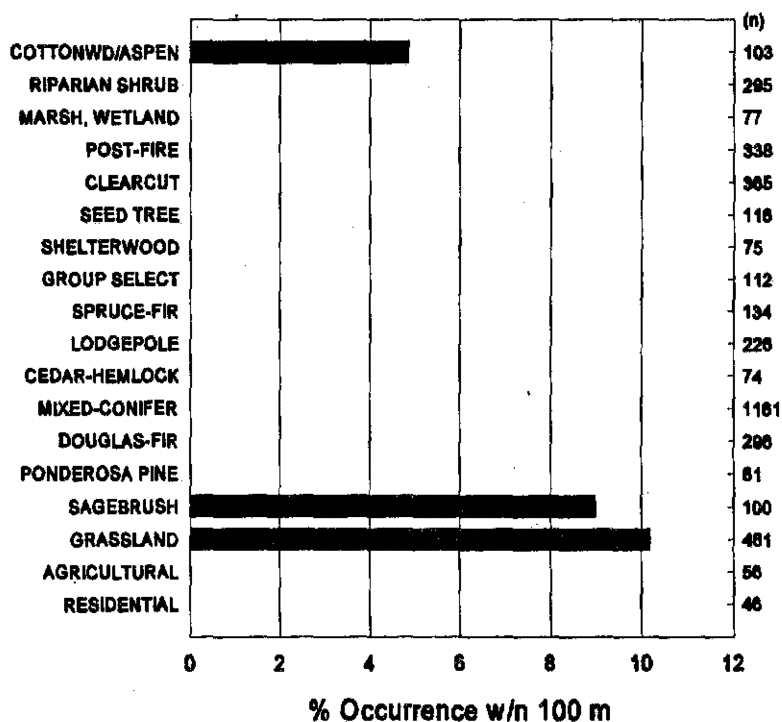
Lark Sparrow

Distribution and habitat use. Lark Sparrows are distributed throughout the region, but are more widespread in the eastern portion (see map at right). They are most closely associated with grassland and sagebrush habitats (see histogram below).



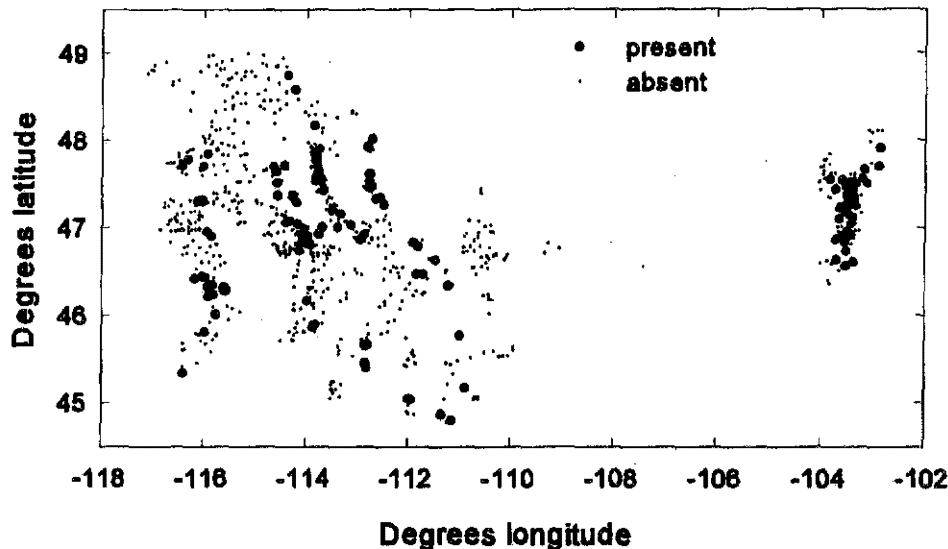
Management Considerations.

Here's another species that is restricted to areas frequented by cattle; we need information on nest success under conditions of heavy and light grazing pressure to be able to make informed recommendations on land-use practices in such areas.



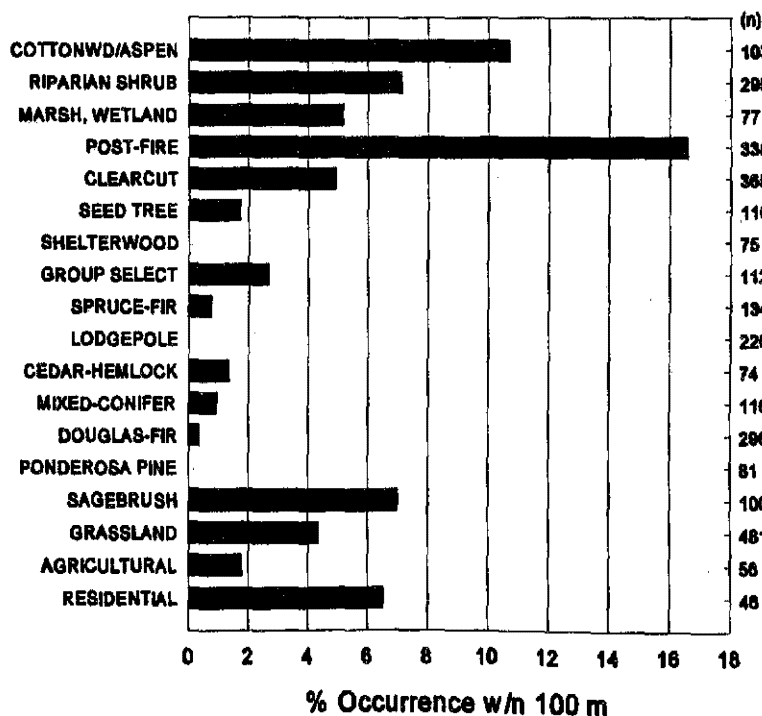
Lazuli Bunting

Distribution and habitat use. Lazuli Buntings occur throughout the region (see map to right). They are associated with shrubfields (especially in post-fire situations), and shrubby vegetation in riparian areas (see histogram below).



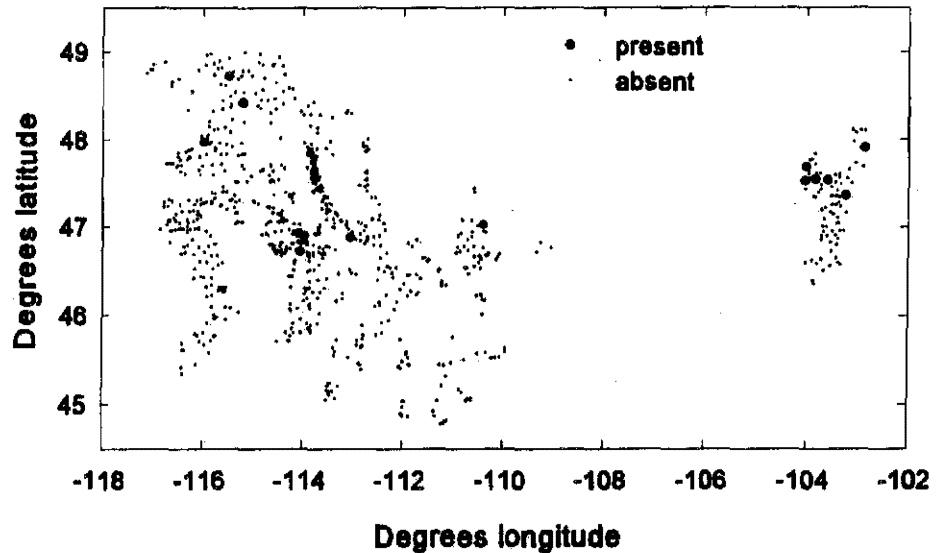
Management Considerations.

Superficially, this species appears to be in good shape, but data from Erick Greene's work suggest that Lazuli Buntings are very susceptible to cowbird parasitism, and are heavily parasitized in areas used by cowbirds. Thus, we need more information on parasitism rates under different management regimes under USFS control (especially cattle grazing around riparian areas).



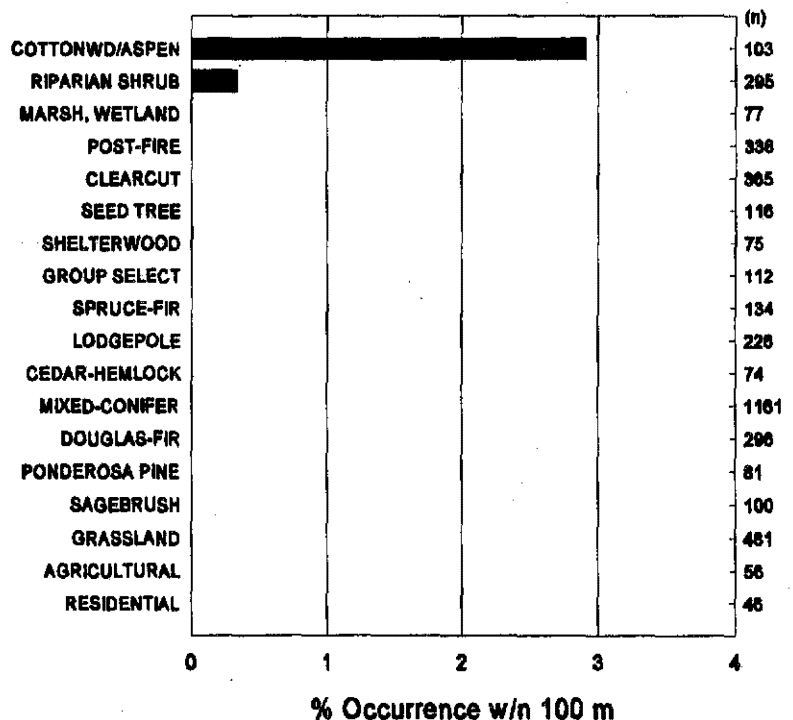
Least Flycatcher

Distribution and habitat use. Least Flycatchers occur throughout the region, but are more widespread in the eastern portion (see map to right). They are tightly associated with riparian bottomland (see histogram below), where they use primarily young, dense sapling stands of cottonwood.



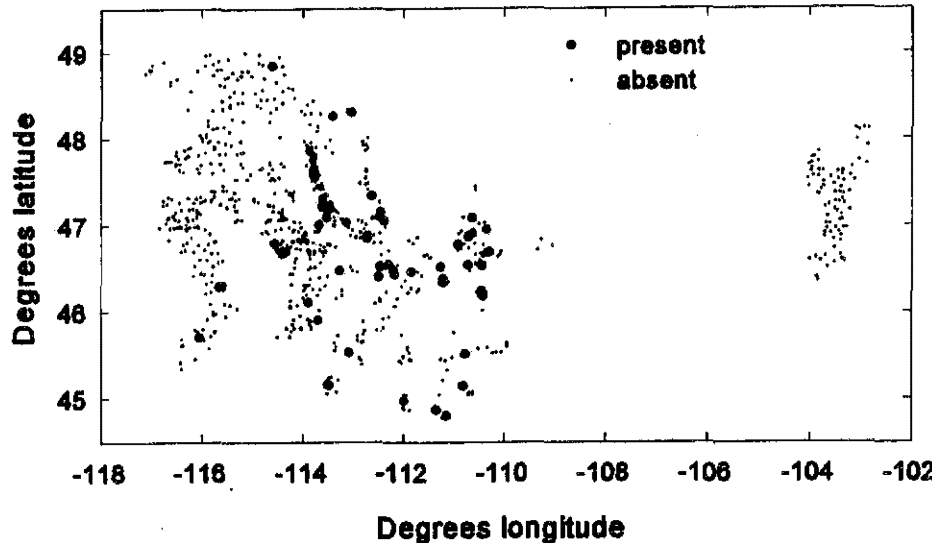
Management Considerations.

It's hard to find a species more specialized in its habitat distribution than this. The main concern here is one of riparian bottomland management, especially the indirect effects of cattle grazing--most importantly, cowbird parasitism. We need data on nest success of this species under alternative management regimes (assuming those alternatives are associated with different cowbird densities).



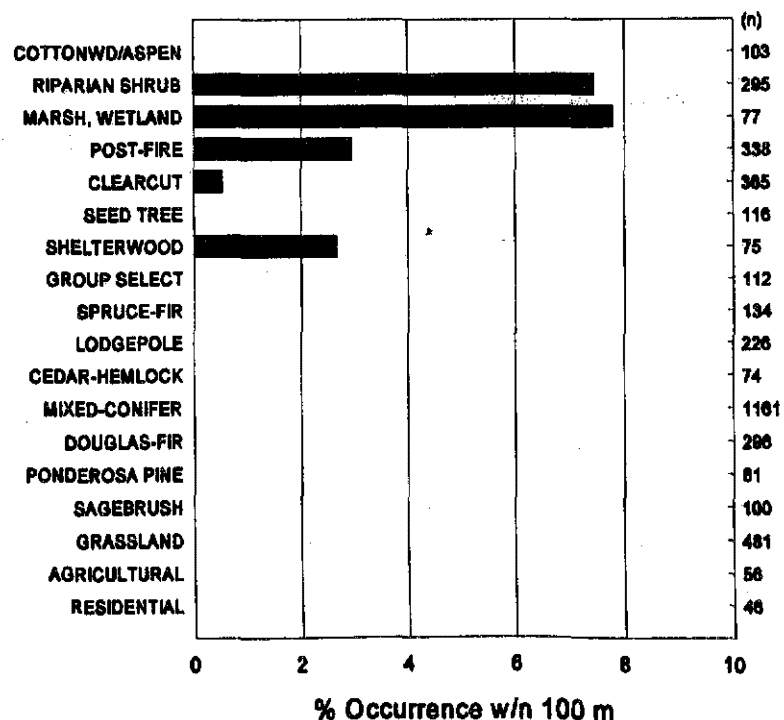
Lincoln's Sparrow

Distribution and habitat use. Lincoln's Sparrow is restricted to the western portion of the region (see map to right), where it occurs in higher elevation streamside riparian and wetland environments (see histogram below). This sparrow is also not uncommon in the wetter draws within early post-fire forests and shelterwood cuts.



Management Considerations.

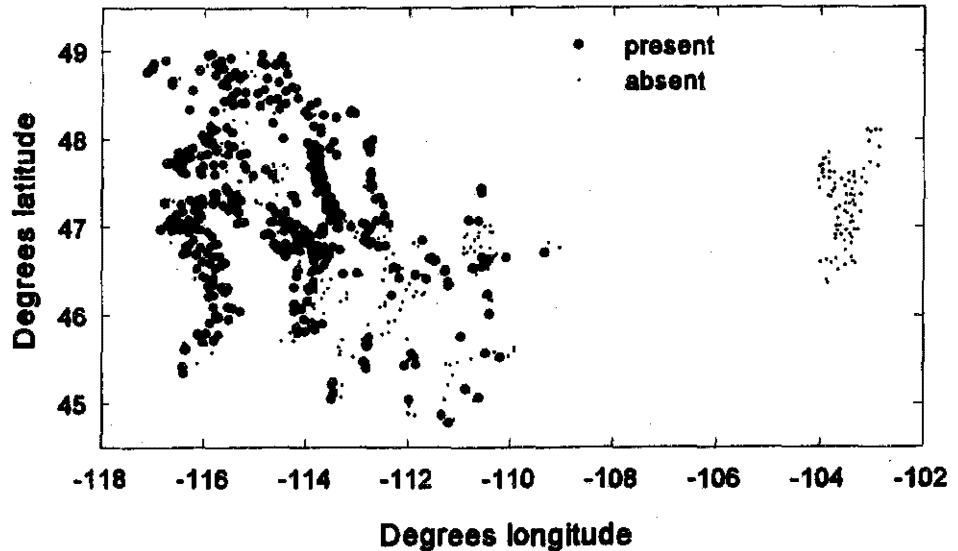
Two unknowns are (1) whether streamside riparian practices are compatible with the needs of this species, and (2) whether they are as common in post-fire situations after salvage sales. Because the species is almost entirely restricted to these conditions, any negative effects would be of considerable consequence to the maintenance of a viable population.



MacGillivray's Warbler

Distribution and habitat use.

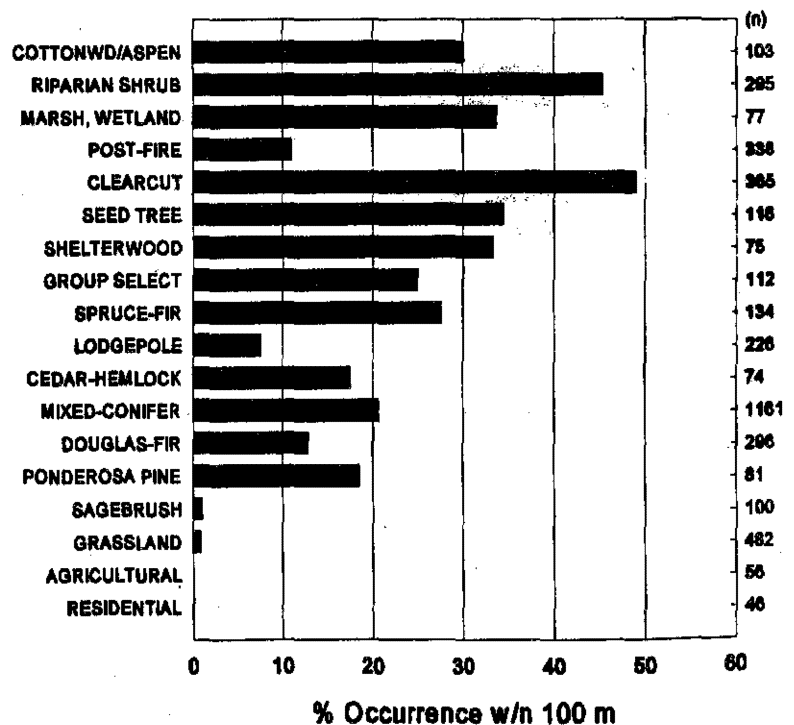
MacGillivray's Warbler is common throughout the western part of the region, and absent from the eastern portion (see map at right). This species needs shrubs, either in association with streamside riparian situations (it is 1.5 times more likely to occur on points with riparian vegetation near), or in association with early successional forests (see



histogram below). The apparent abundance of this species in relatively undisturbed forest types is largely a product of the fact that these cover types include selectively harvested patches that generally have decent shrub growth. Note that the species is abundant in clearcuts, but not early post-fire types; this too is likely to be a product of shrub cover differences.

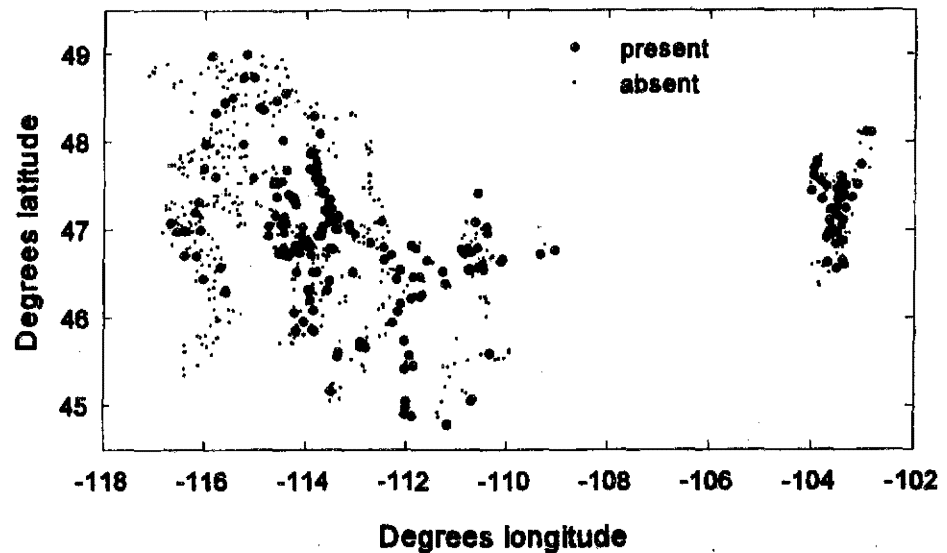
Management considerations.

MacGillivray's Warbler would appear to benefit from a variety of forest harvesting methods. Whether their reproductive success mirrors the census data or whether we are creating "ecological traps" by attracting this species into places where they do poorly is, however, unknown. Also, management activity that encourages artificially rapid regeneration of the forest (e.g., tree planting) would reduce the duration of early successional stages and act to the detriment of this shrub-dependent species.



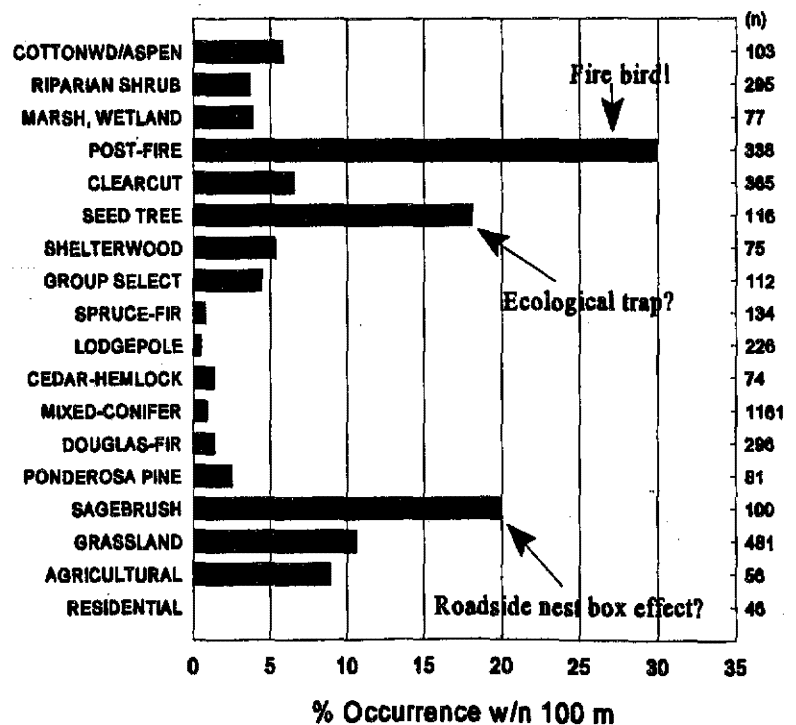
Mountain Bluebird

Distribution and habitat use. Mountain Bluebirds occur throughout the region (see map at right). Their association with early post-fire habitat is clearly evident (see histogram below), and even more dramatic when one considers that the abundances reflected in the open, agricultural, grassland, and sagebrush habitats are largely an artifact of roadside nest boxes, which have been placed by a well-meaning, but misguided public.



Management considerations.

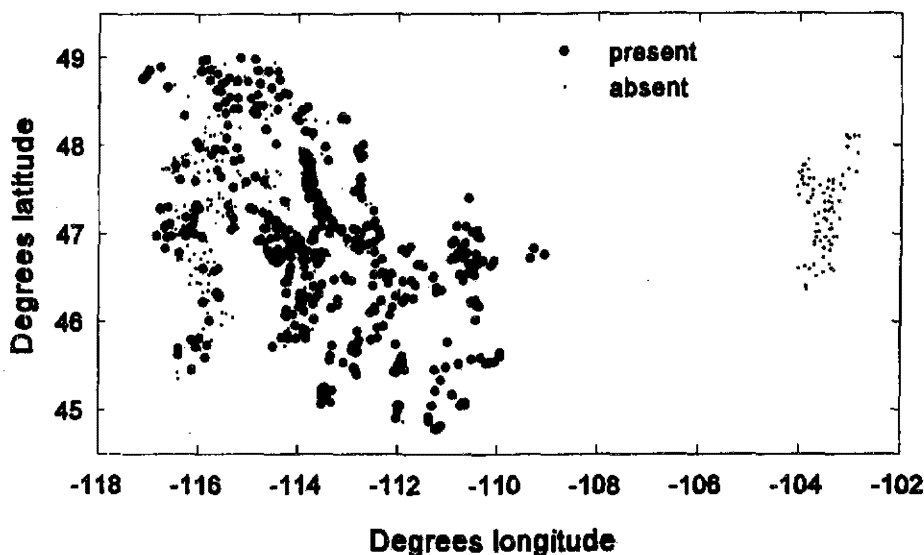
There are three issues of interest here: (1) this bird species is a cavity nester that depends heavily on (is relatively restricted to) post-fire habitat. This means that post-fire salvage cutting operations may be affecting bluebird populations negatively; (2) the moderately high abundance in seed tree cuts suggests either that this cutting style is a good surrogate for early post-fire habitat, or that we are creating an "ecological trap" for this species. Nest success studies are clearly needed; (3) the use of nest boxes along public roadsides should be discouraged if it can be shown that such boxes create artificially high population densities of this species.



Mountain Chickadee

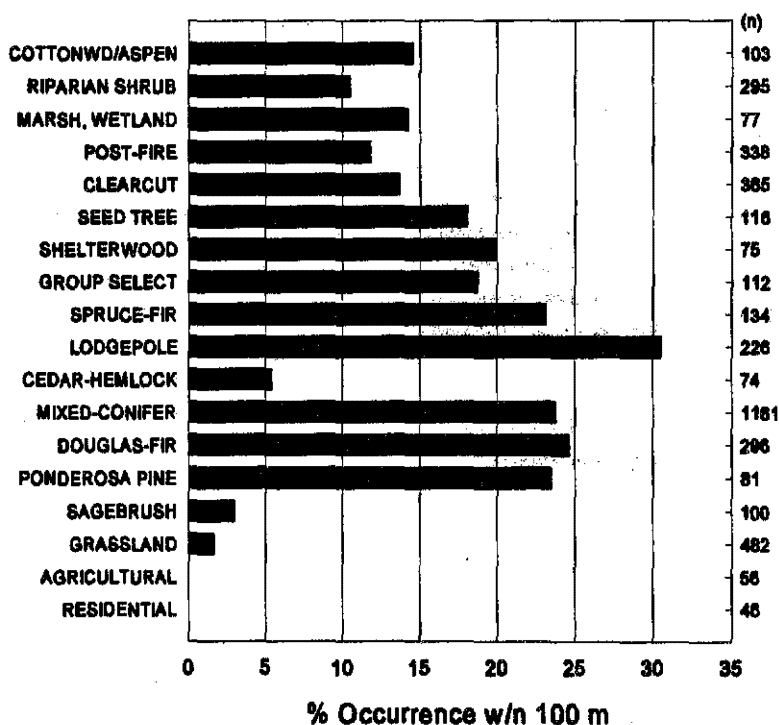
Distribution and habitat use. Mountain Chickadees are widespread throughout the western part of the region (see map to right). This is clearly a conifer-forest bird that is as common in harvested as it is in relatively unharvested forest types (see histogram below). Interestingly, although this species is a cavity nester, it is no more common on points with an abundance of snags (16.0% occurrence) than it is on points with no snags

(15.6% occurrence). It is, however, twice as common when there is an abundance of dead and down near, reflecting the fact that it uses rotting stumps disproportionately often as nest sites (we classified stumps as dead and down rather than snags).



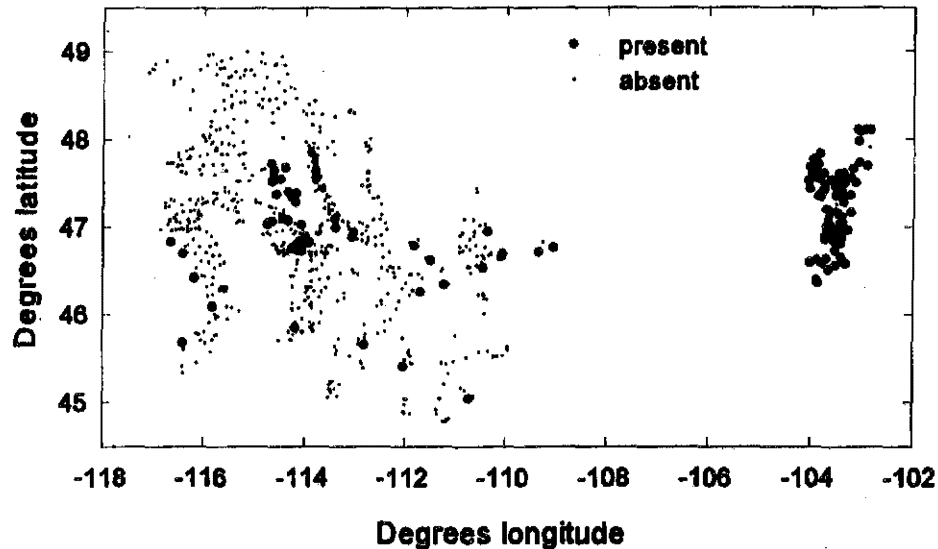
Management considerations.

This species appears to be uniformly less (but not dramatically less) abundant in variously cut conifer forests. Overall, it appears to need relatively old, intact forests to achieve maximum abundance levels. Whether reproductive success is also less in cut forests, or whether success is somewhat higher (to compensate for the lower abundance), is unknown but worth study.



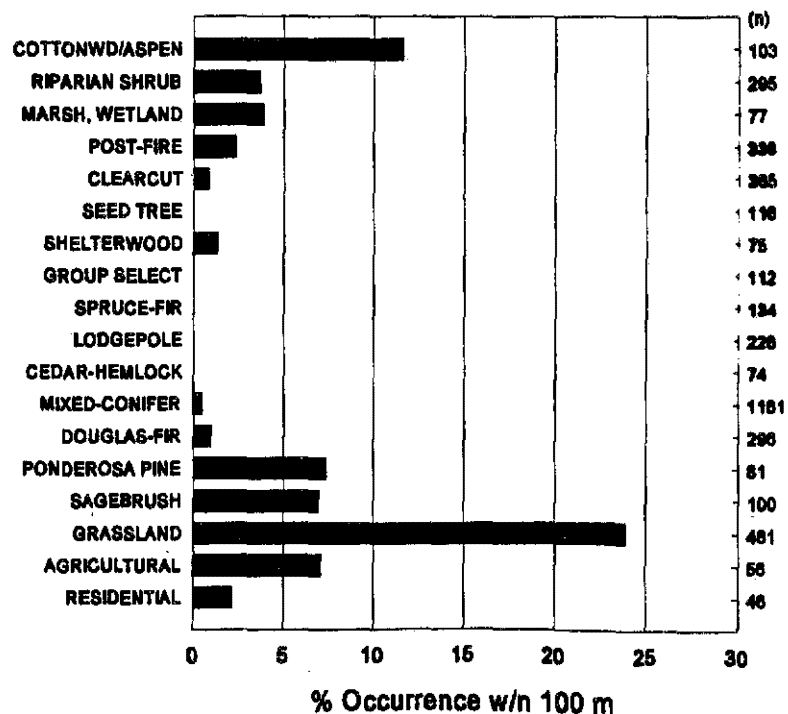
Mourning Dove

Distribution and habitat use. Mourning Doves are distributed throughout the region (see map to right). They are a low-elevation, open-country bird that nests in cottonwood bottomlands and large trees associated with agriculture and grassland (see histogram below).



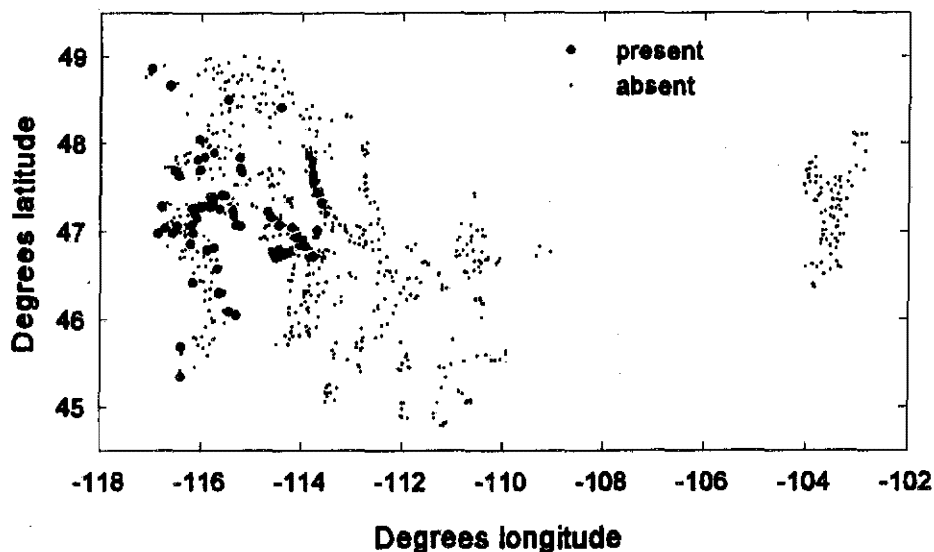
Management Considerations.

None suggested by the data or known nesting requirements of the species.

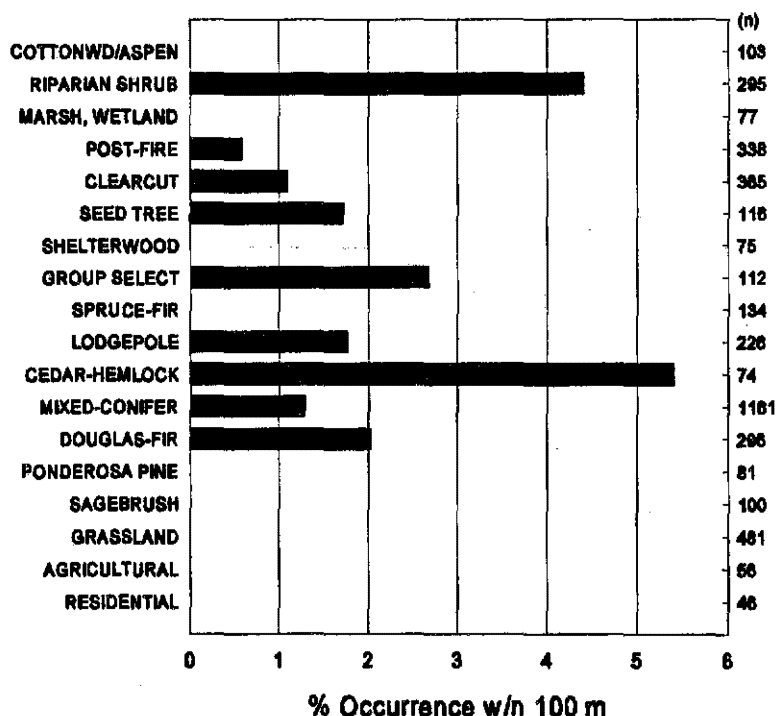


Nashville Warbler

Distribution and habitat use. Nashville Warbler is common throughout the westernmost portion of the region (see map to right). They are especially common in cedar-hemlock forests and riparian shrub communities (see histogram below).

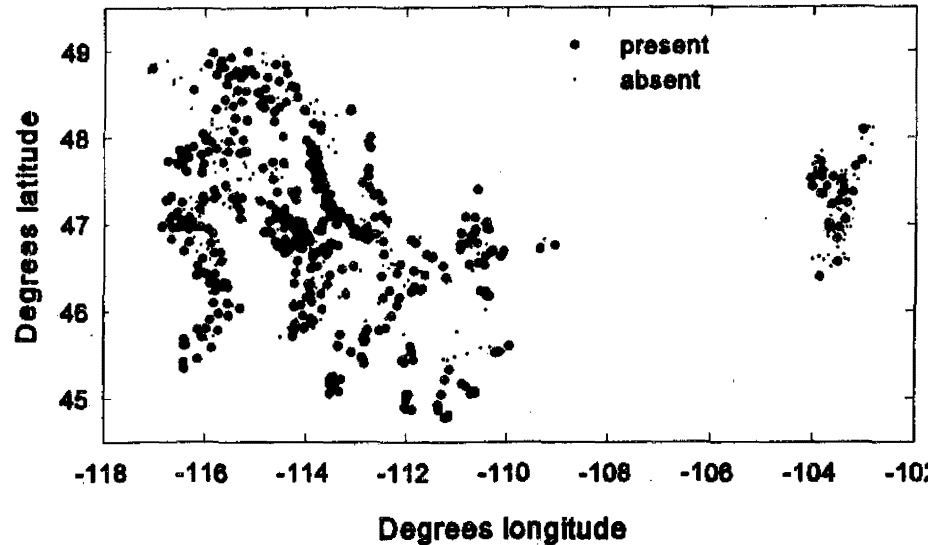


Management Considerations.
None suggested by the data.



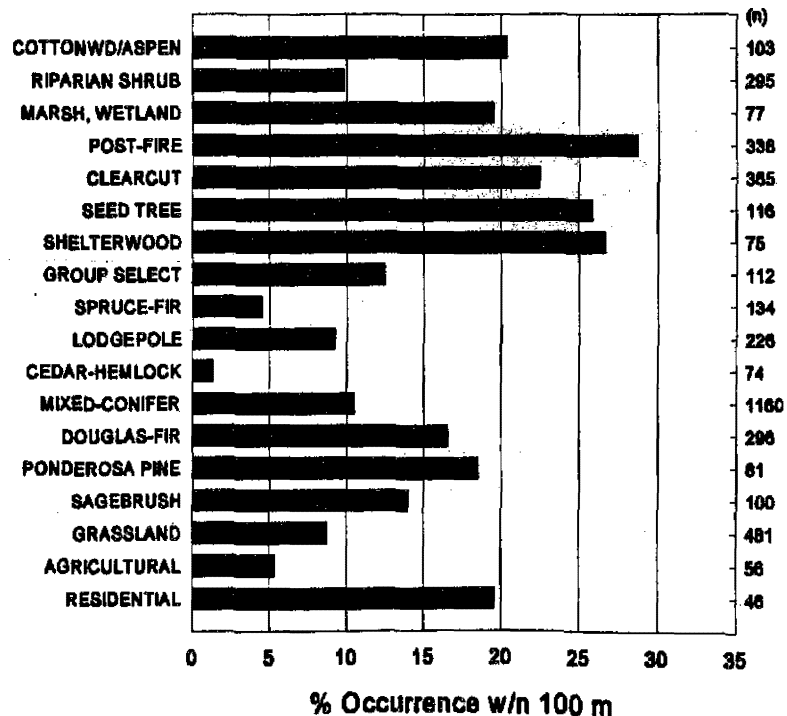
Northern Flicker

Distribution and habitat use. Northern Flickers are distributed throughout the region (see map to right). They occur in a wide variety of the more open cover types, and are most commonly detected in variously cut and early post-fire forests (see histogram below).



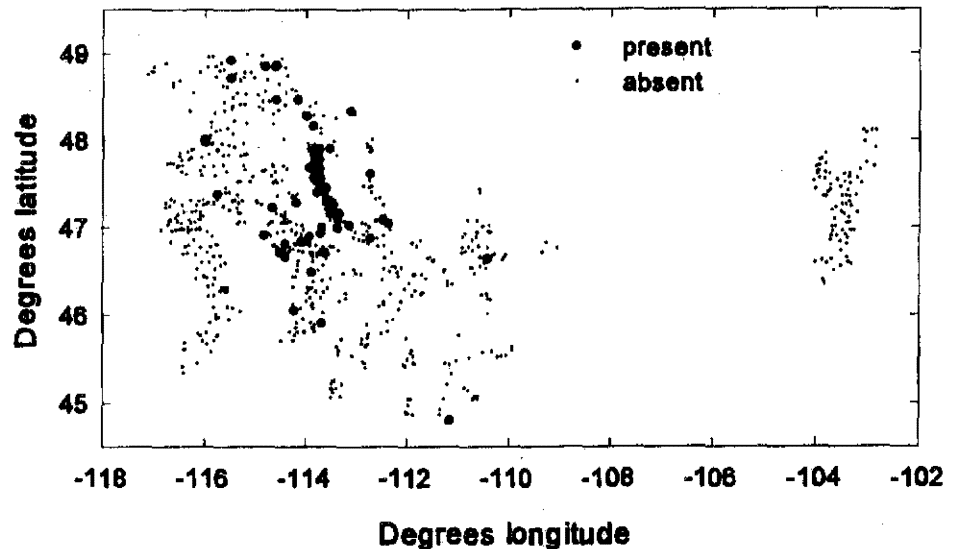
Management Considerations.

Because of its breadth of habitat use, I suspect there is little of potential management concern here, but the relative abundance in cut forests suggests either that cut forests serve as "super-normal releasers" and draw the birds into places that are otherwise unsuitable, or that the cut forests are truly great places to be; we would need data on reproductive success to comment further.



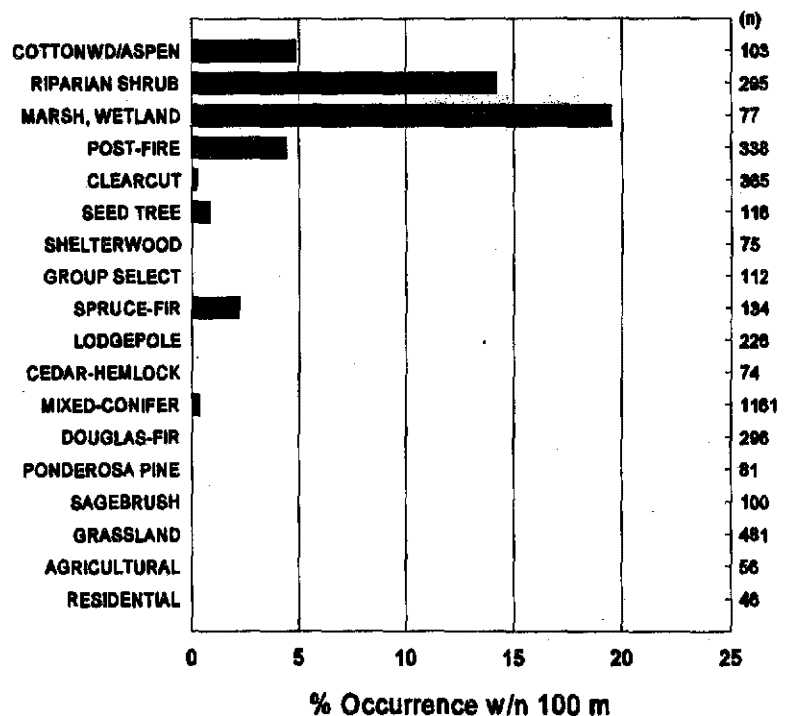
Northern Waterthrush

Distribution and habitat use. The Northern Waterthrush is restricted to the western portion of the region (see map to right), where it is entirely restricted to riparian areas (see histogram below). The detections from post-fire areas were also along rivers and bogs, but in the absence of riparian vegetation, we would not have recorded that riparian was near.



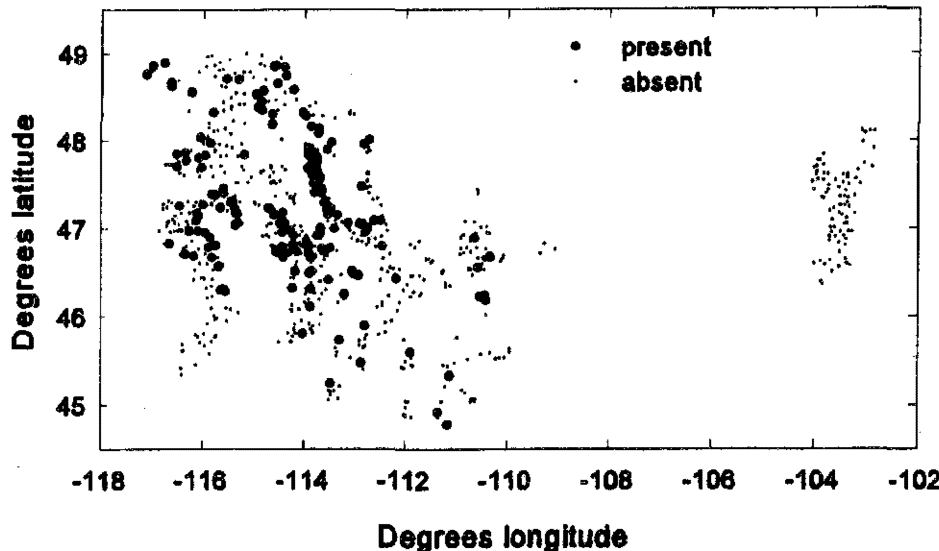
Management Considerations.

This is another species that may be sensitive to streamside management practices and would, therefore, serve as a good indicator of whether "best management practices" are really serving the needs of wildlife species.



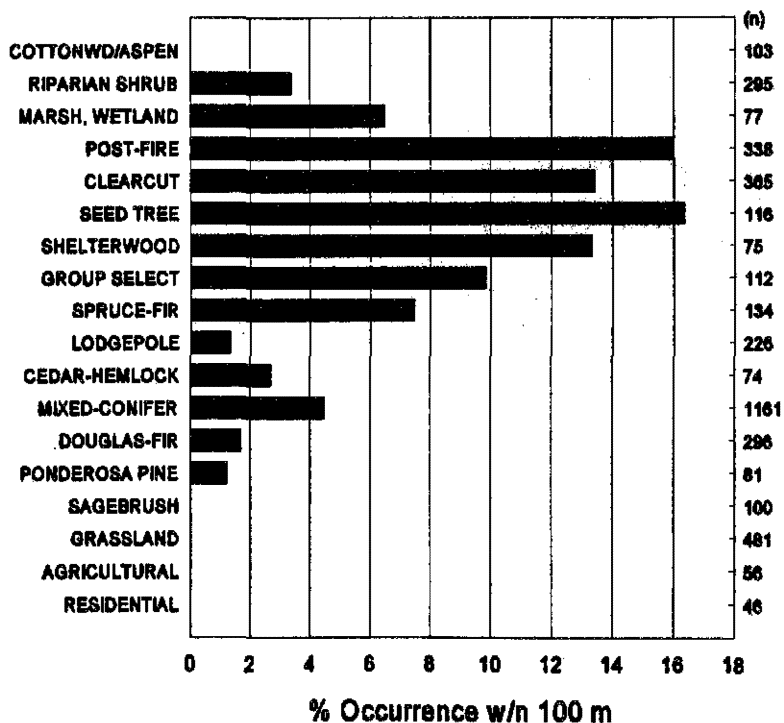
Olive-sided Flycatcher

Distribution and habitat use. Olive-sided Flycatchers are widespread throughout the western part of the region (see map). Under natural conditions, this is clearly a post-fire dependent bird species (see histogram), but it appears to be as common in the various harvested cover types as well.



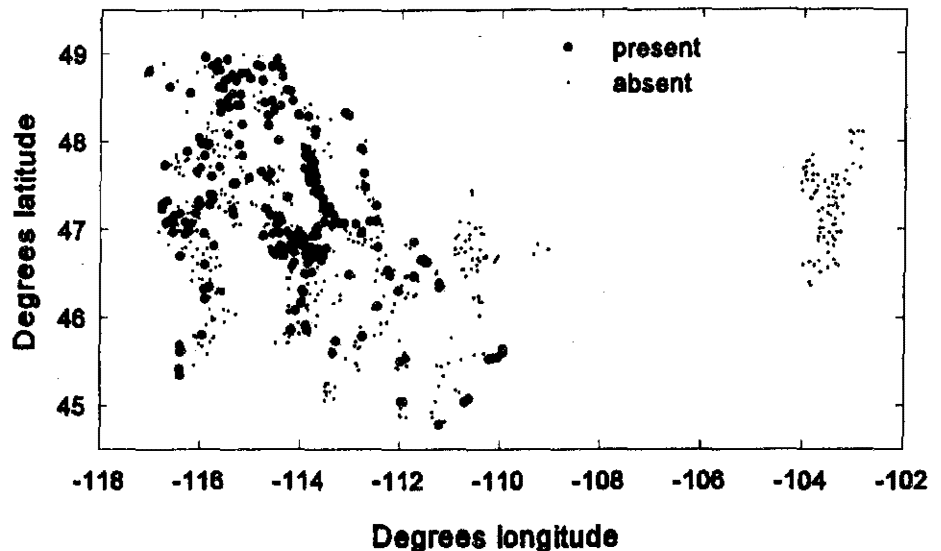
Management considerations.

This species is one of the western species that has declined rather seriously during the past 30 years. Given its propensity to use harvested forest types, this is a bit of a mystery to me. It suggests an urgent need to see if the census data are a misleading indicator of nesting success. In other words, are we creating an "ecological trap" for the species by cutting in a way that provides only the appearance of an early post-fire scene and little else, or are these harvested forest patches really ok?



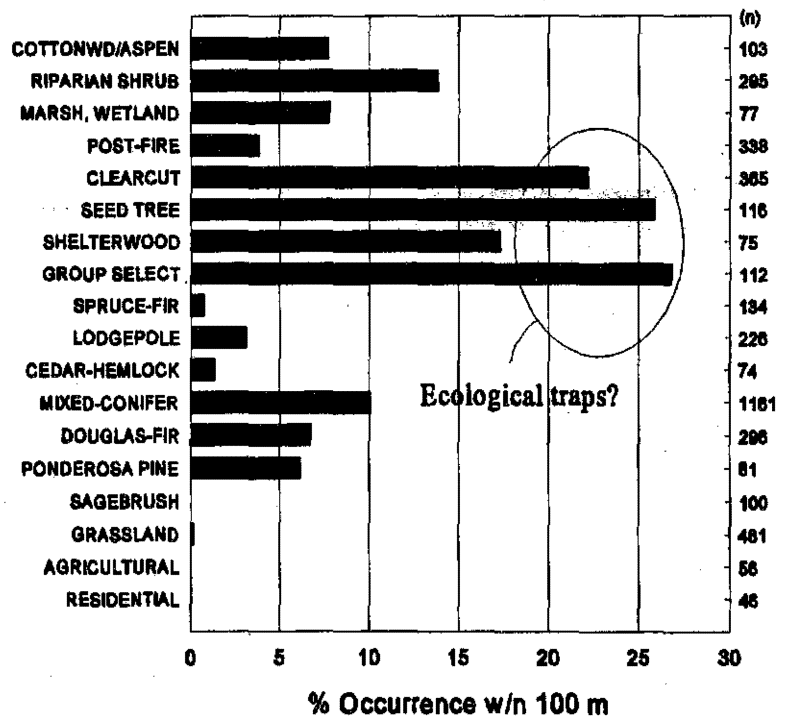
Orange-crowned Warbler

Distribution and habitat use. Orange-crowned Warblers are restricted to the western portion of the region (see map to right), where they occur in shrubby patches within uncut forest and more widely throughout early successional forests after they have been cut (see histogram below).



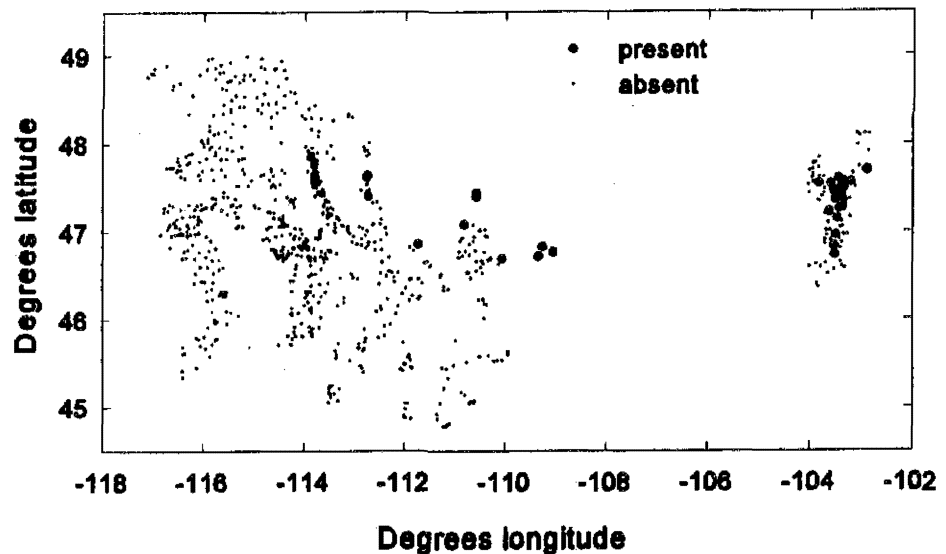
Management Considerations.

This is a classic example of a species that is more abundant in harvested forest types than in any of the other cover types. The main management concern is one of whether the species is doing well in those artificially created forests where it is abundant. In such situations, we really need to know whether we are creating "ecological traps" or not.

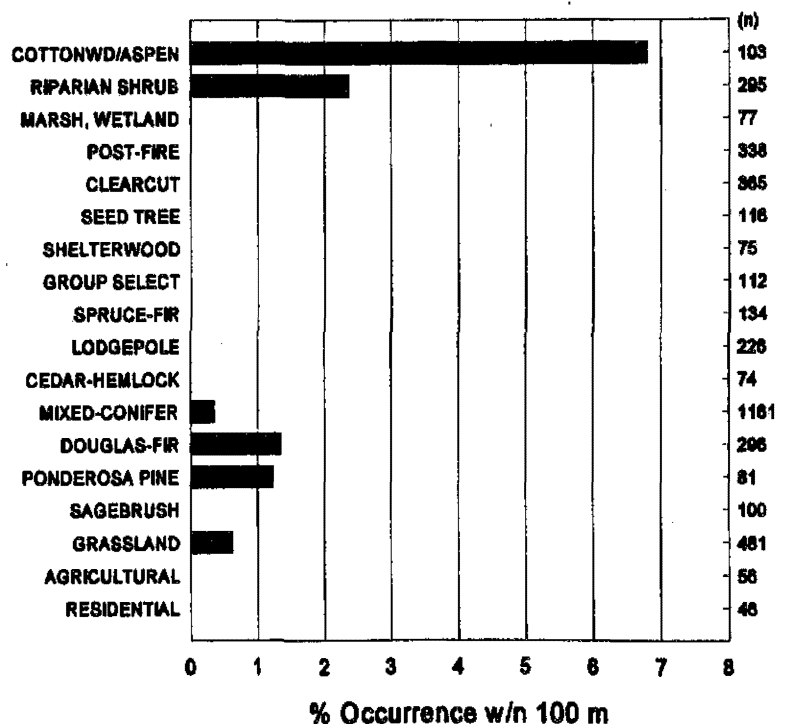


Ovenbird

Distribution and habitat use. Ovenbirds are distributed throughout the region (see map to right), where they are restricted to riparian bottomland forests (see histogram below). I have no idea what the detections are in the conifer forest types, but my guess is that they are all mis-identifications.



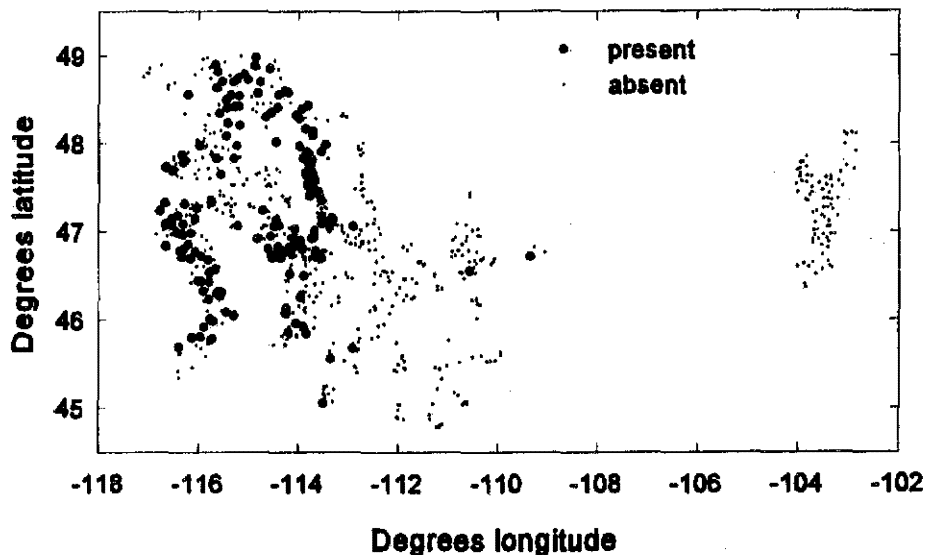
Management Considerations. Here is another species that is totally restricted to a cover type that occurs across less than 0.5% of all the land area out there. Because its limited habitat distribution, we need to know the effect of alternative riparian management regimes on both the presence and nesting success of this species.



Pileated Woodpecker

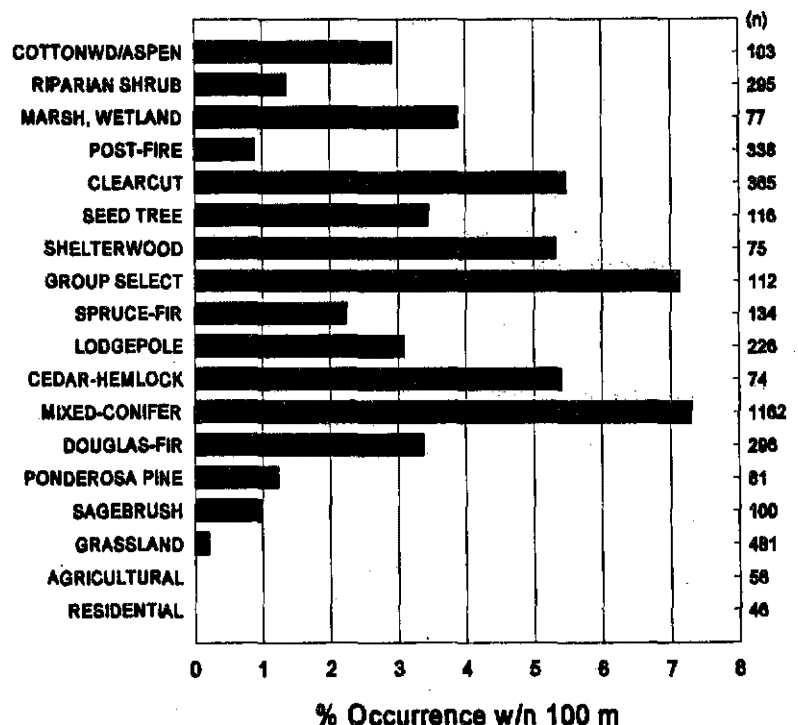
Distribution and habitat use. Pileated Woodpeckers are widespread throughout the western third of the region (see map at right). They are relatively common in both uncut and cut mid-elevation conifer forests (see histogram below). Their abundance in harvested forest types is, in part, a consequence of their mobility; they need large trees in the relatively uncut stands for nesting purposes, which is reflected in the

fact that they occur significantly more often on points with an abundance of snags (6.0%) and dead/down (5.1%) than on points without those characteristics (2.1% and 1.1%, respectively).



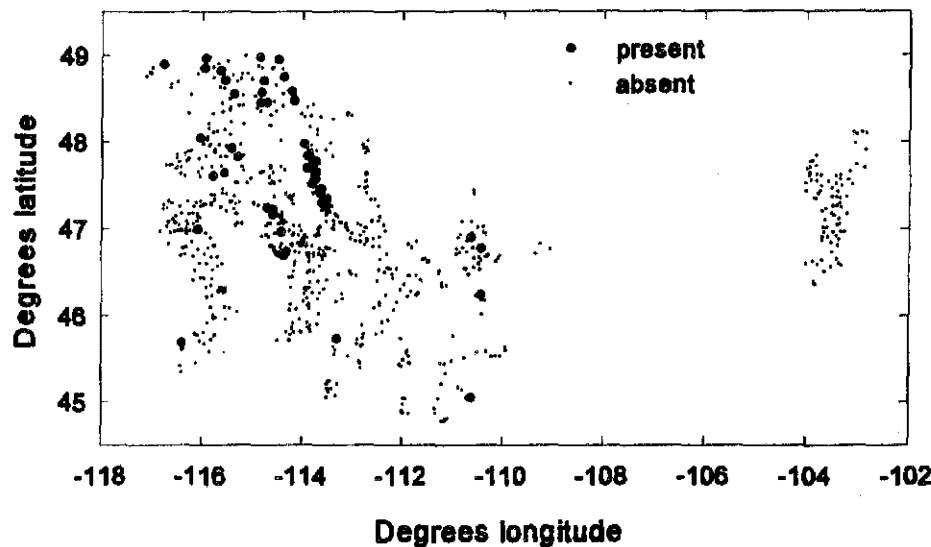
Management considerations.

This species appears to do well in a matrix of forest types, but the inclusion of some older forest with large trees is probably necessary. There's generally always an intact forest near where these birds are detected (though not necessarily within 100 m). Thus, detecting them in clearcuts and seed-tree cuts should **not** be taken to mean they can do well with homogenous stands of those kinds.



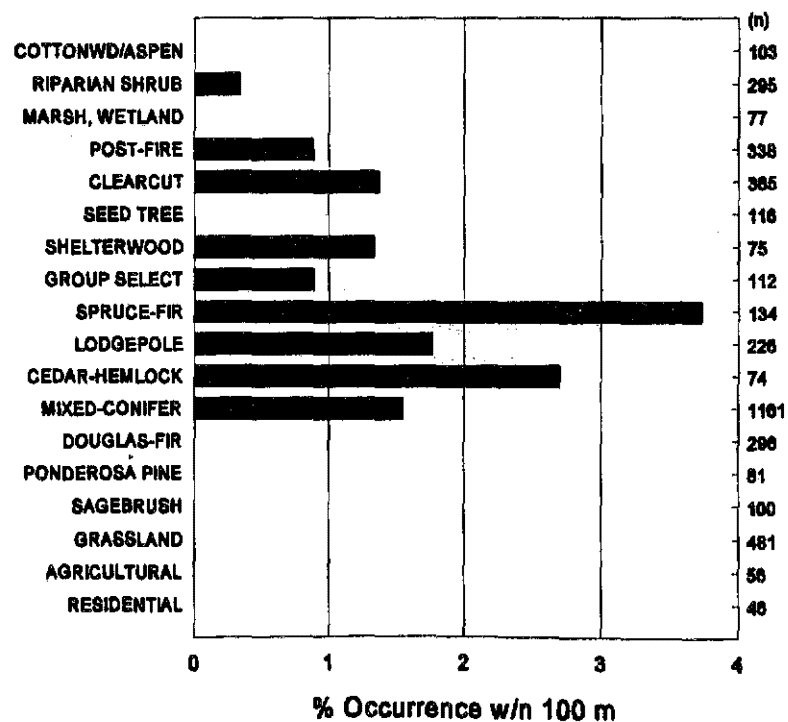
Pine Grosbeak

Distribution and habitat use. Pine Grosbeaks are restricted to the western portion of the region (see map to right). They occur most commonly in the higher elevation conifer forests, and do not appear to be as common in the harvested forest types as they are in the relatively uncut forests (see histogram below).



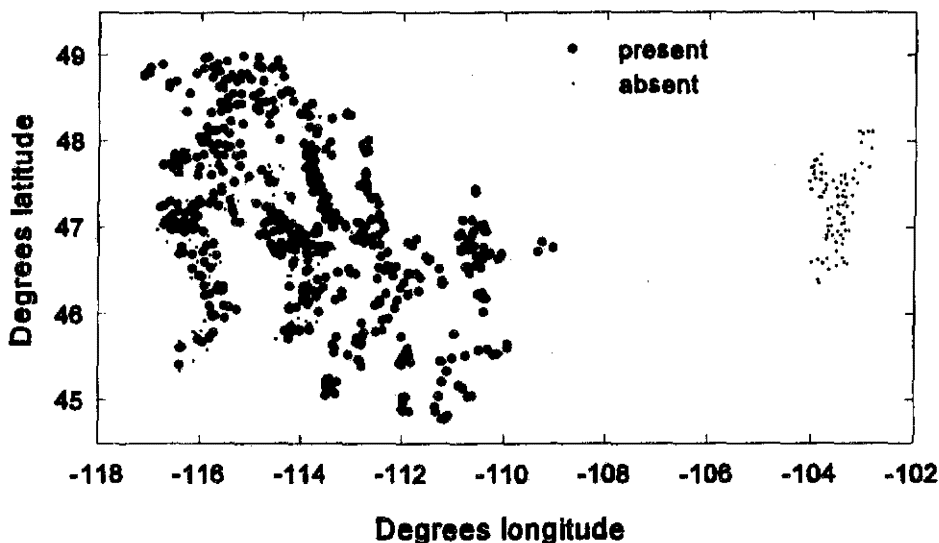
Management Considerations.

This is another species that is more abundant in relatively uncut than in cut forest types. The maintenance of viable populations of this species probably necessitates (to some extent, at least) the maintenance of tracts of relatively uncut, high elevation conifer forests.



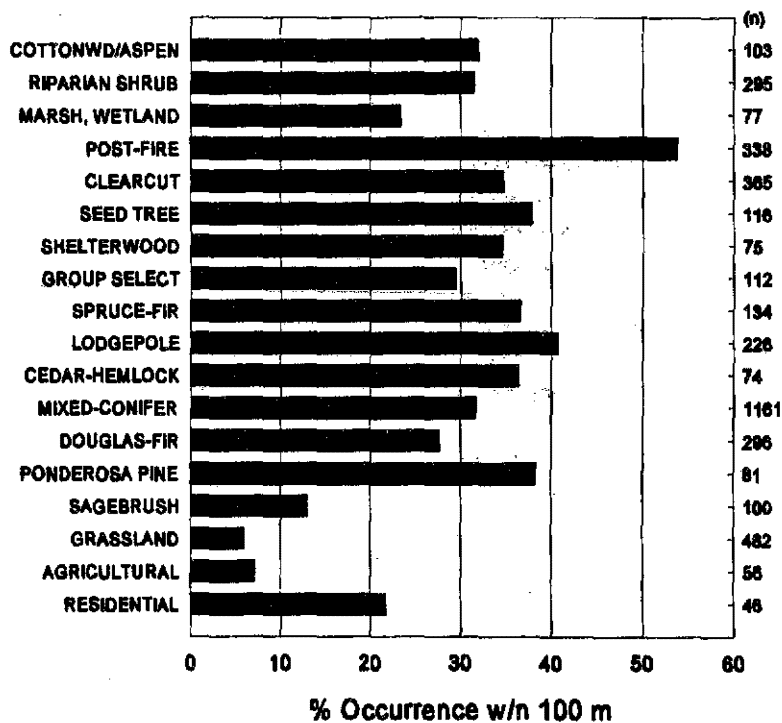
Pine Siskin

Distribution and habitat use. Pine Siskins are restricted to the western portion of the region (see map to right), where they are probably more broadly distributed across cover types than most any other songbird species (see histogram below). Note that they are nearly twice as common in post-fire habitat as in any other, however.



Management Considerations.

The widespread distribution of this species suggests that there is little of management concern here. Nonetheless, because of their relatively high abundance in post-fire situations (probably in response to the increase in seed availability), we should be thinking about the possible negative impact of post-fire salvage cutting. In addition, there are data from western Montana that show a positive correlation between siskin density and severity of budworm outbreak; they may rely to some extent on such outbreaks. Because the species is so vocal and wide-ranging, it may be impossible to determine its habitat needs from habitat distribution data alone.

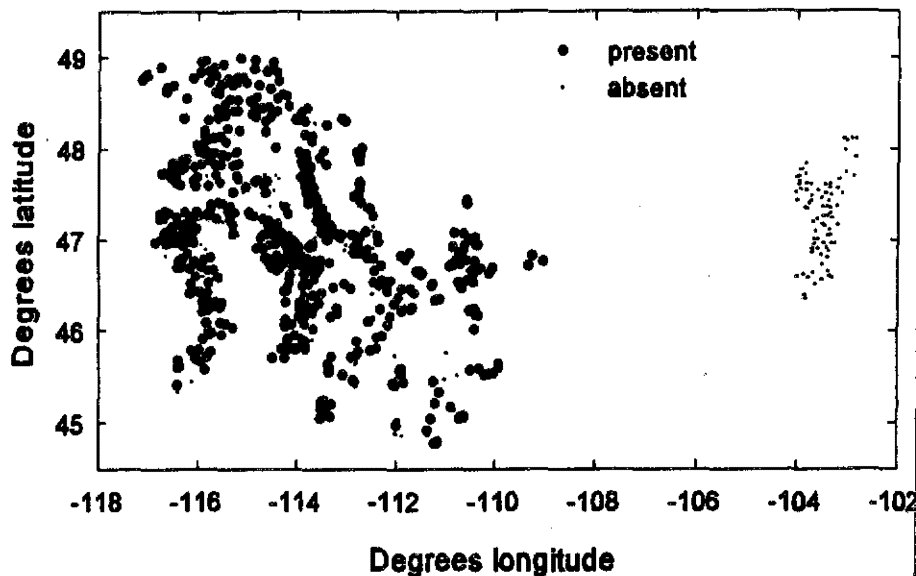


Red-breasted Nuthatch

Distribution and habitat use.

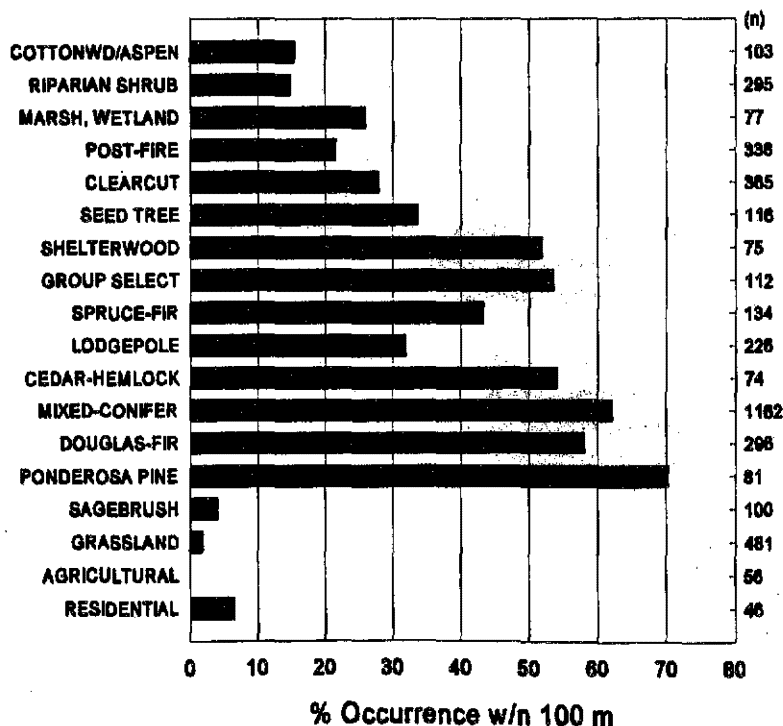
This is one of the most common species in the western portion of the region (see map to right). The Red-breasted Nuthatch is especially common in the lower-elevation forest types (see histogram), where it is significantly more likely to occur when either snags or dead/down material are common (39.3% and 38.7% occurrence, respectively) than when they are not (24.6% and 11.5% occurrence, respectively).

The association with drier, open forest conditions is also reflected in the fact that this species is two times less likely to occur when riparian elements are near (19.3% occurrence) than when they are not (38.0% occurrence).



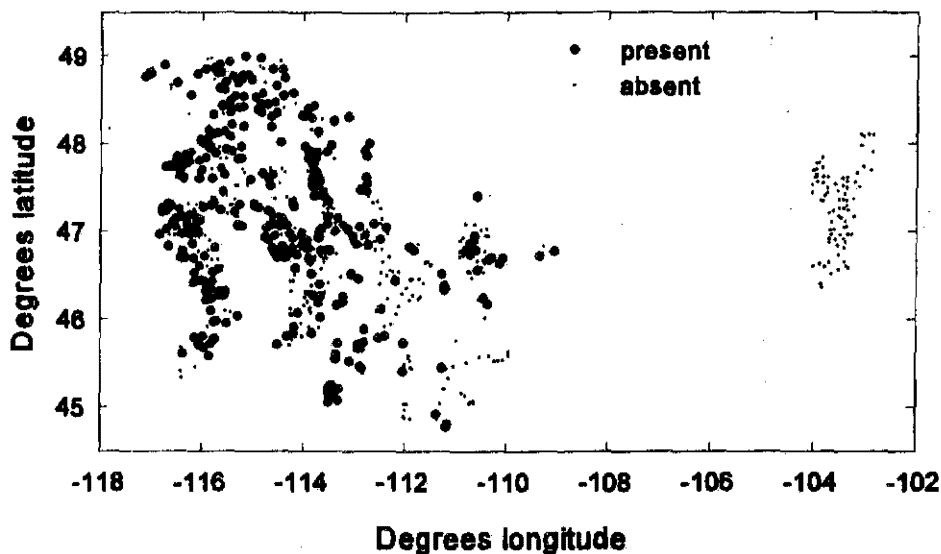
Management considerations.

Although Red-breasted Nuthatches occur not uncommonly in cut forest types, it is clear that their probability of occurrence decreases steadily with increasing amounts of timber removed (see histogram). In fact, this is one species that has been shown through literature review to be consistently less abundant in harvested than unharvested Rocky Mountain forests (Hutto et al. 1993, Hejl et al. 1995). Were it not for its widespread occurrence across most of the relatively uncut conifer forest types, this would be a much more serious management concern.

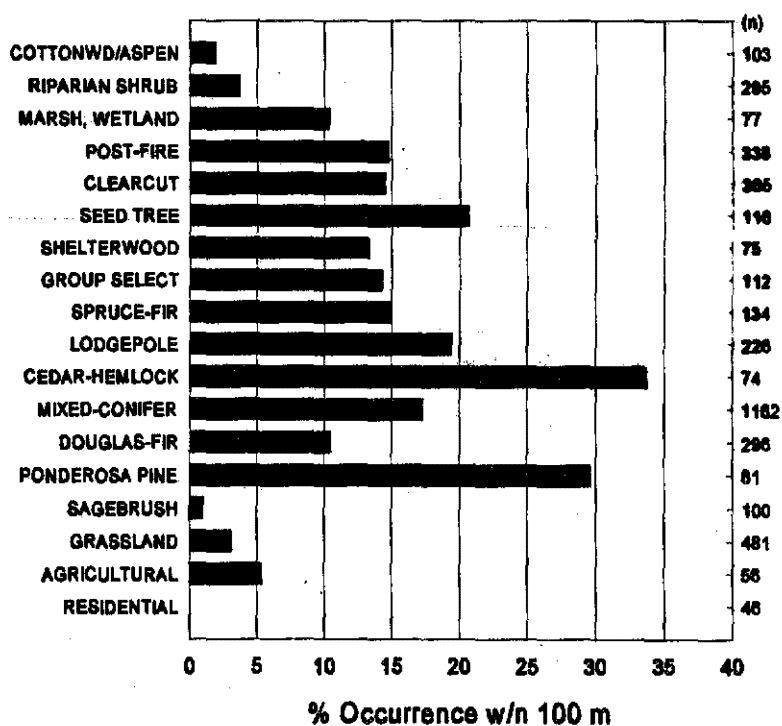


Red Crossbill

Distribution and habitat use. Red Crossbills are restricted to the western portion of the region (see map to right), where they are broadly distributed across most of the conifer forest types (see histogram below).



Management Considerations. None suggested by the data, but I should point out that this is an extremely mobile and widespread bird species that can be detected most anywhere. It will take more information on its nesting and feeding biology to determine its precise habitat needs.



Red-eyed Vireo

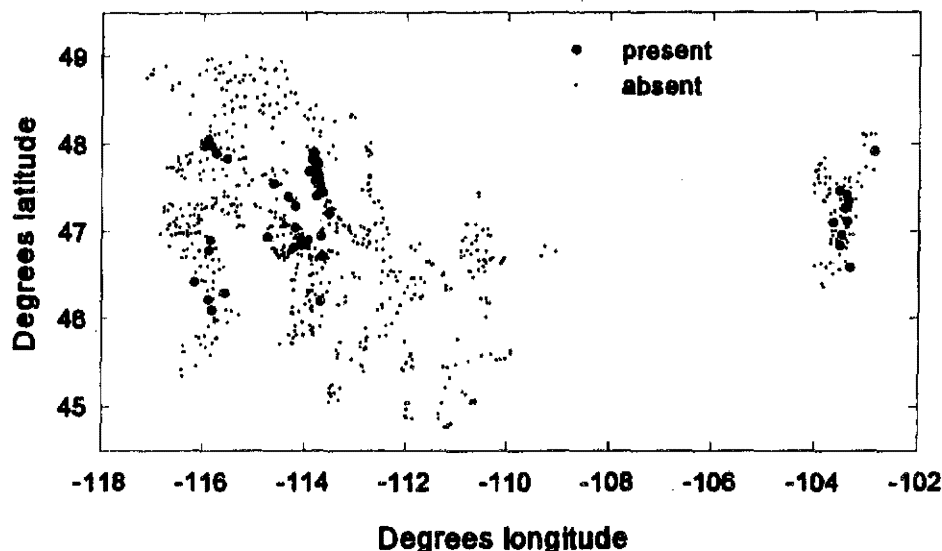
Distribution and habitat use.

Red-eyed Vireos occur throughout the region (see map to right).

In my experience, this species is entirely restricted to aspen and cottonwood bottomland forests, and the data are largely consistent with this impression (see histogram below). The minor

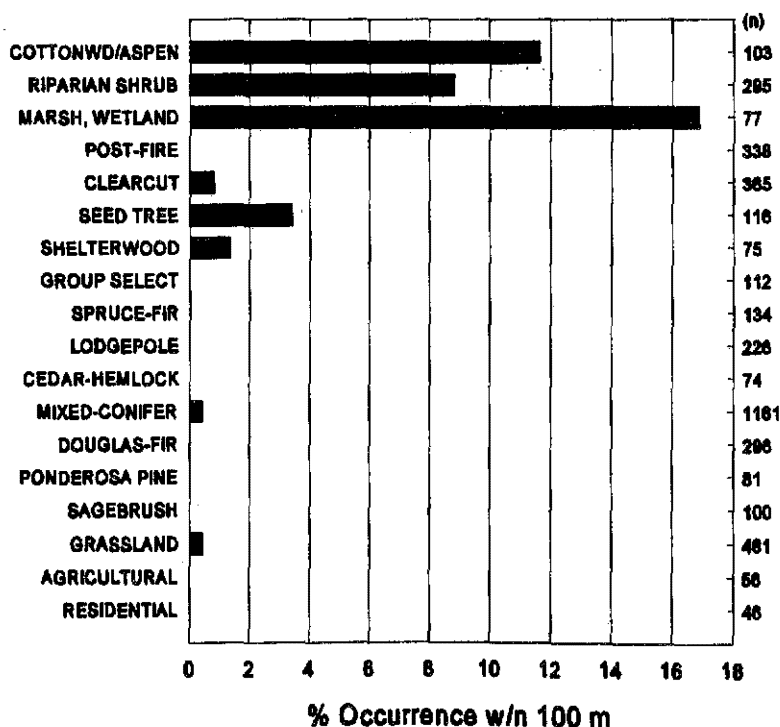
occurrences in a few cut forest types reflect either mis-identifications or the fact that large deciduous

trees are often left after a harvest. The abundances in marsh/wetland and riparian shrub types are also artifacts of cottonwoods that are often mixed with those types.



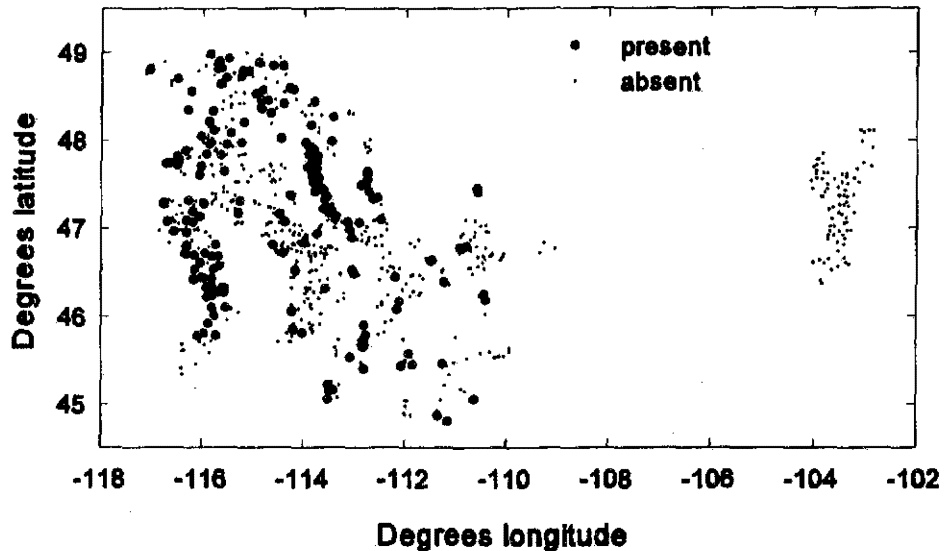
Management considerations.

Because of its restriction to a forest cover type that is rare on the landscape, it becomes critical to ensure that the species is doing well there. Unfortunately, Red-eyed Vireos are declining in the West, and have definitely declined locally since I have been teaching ornithology here. I believe cowbird parasitism may be to blame, which means that the main management issue is the fragmentation and cattle grazing associated with most of our riparian bottomlands.



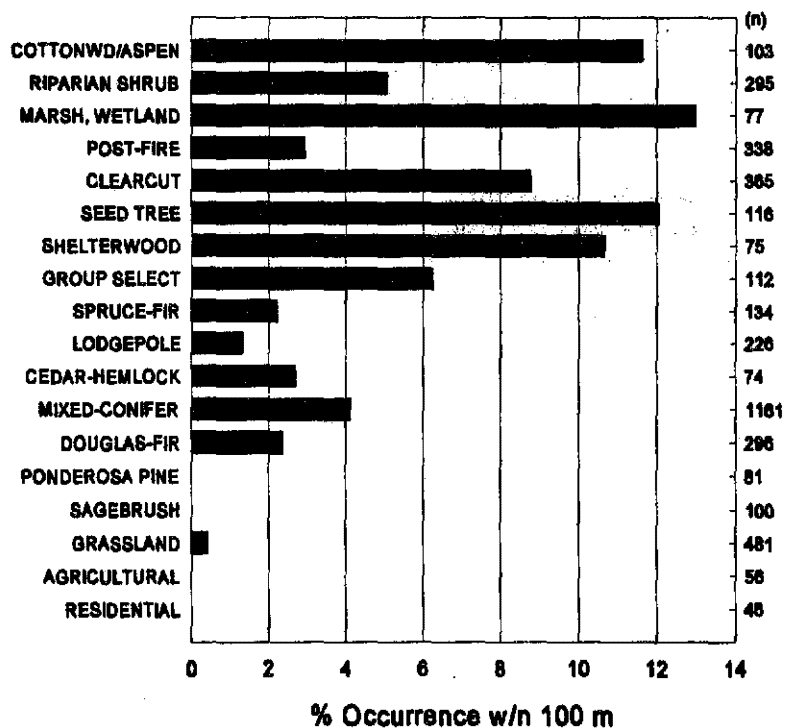
Red-naped Sapsucker

Distribution and habitat use. Red-naped Sapsuckers are restricted to the western portion of the region (see map at right), where they are associated primarily with streamside riparian and bottomland riparian forests (see histogram below). It is likely that the occurrences in pure conifer forest types are either associated with riparian elements that were not checked off as "riparian near", or were mis-identifications.



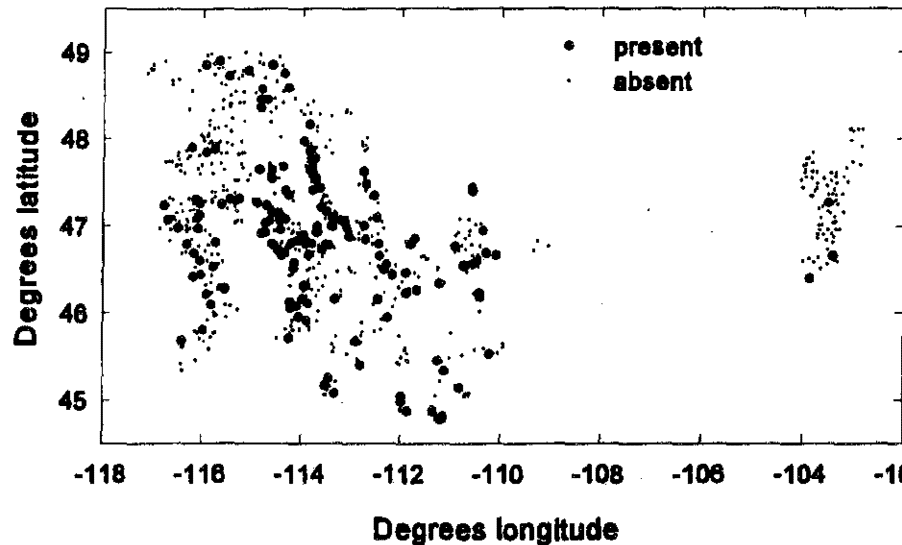
Management Considerations.

The apparent suitability of harvested conifer forests to Red-naped Sapsuckers could be misleading if they do not do well there in terms of reproductive success. Fortunately, there are data on nest success in both unharvested and harvested forest plots in Coram Experimental Forest, and there is no significant difference in nest success (Tobalske, B. W., et al. 1990, *The Northwest Environmental Journal* 6:398-399; Tobalske, B. W., et al. 1991, Research Paper INT-442. USDA Forest Service, Ogden, UT, 12 pp.).



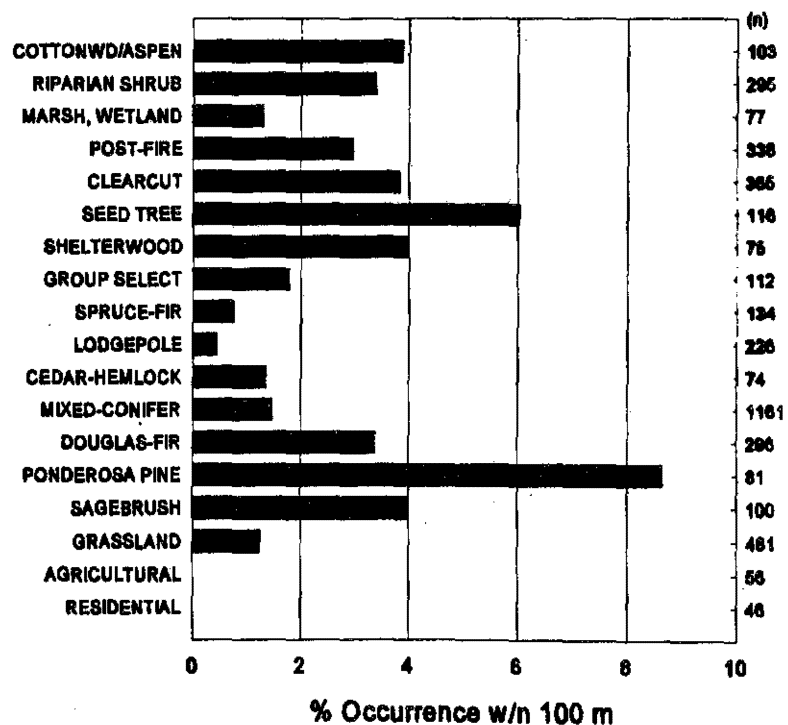
Red-tailed Hawk

Distribution and habitat use. Red-tailed Hawks occur throughout the region, but are more widespread in the western portion (see map at right). They occur predominantly in the more open, low-elevation forest cover types, especially ponderosa pine forests (see histogram below).



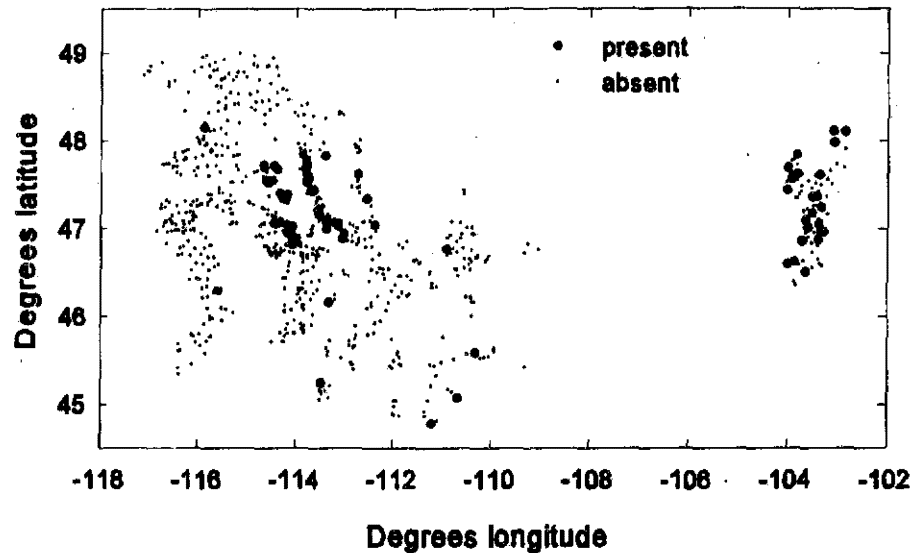
Management Considerations.

This species is not really part of the "songbird" program, but it was one of the most commonly detected species, so we include it here. There do not appear to be management issues of any concern; the hawk does well in cut forests, and would not be expected to suffer poor reproductive success under such conditions. It's probably in good shape.



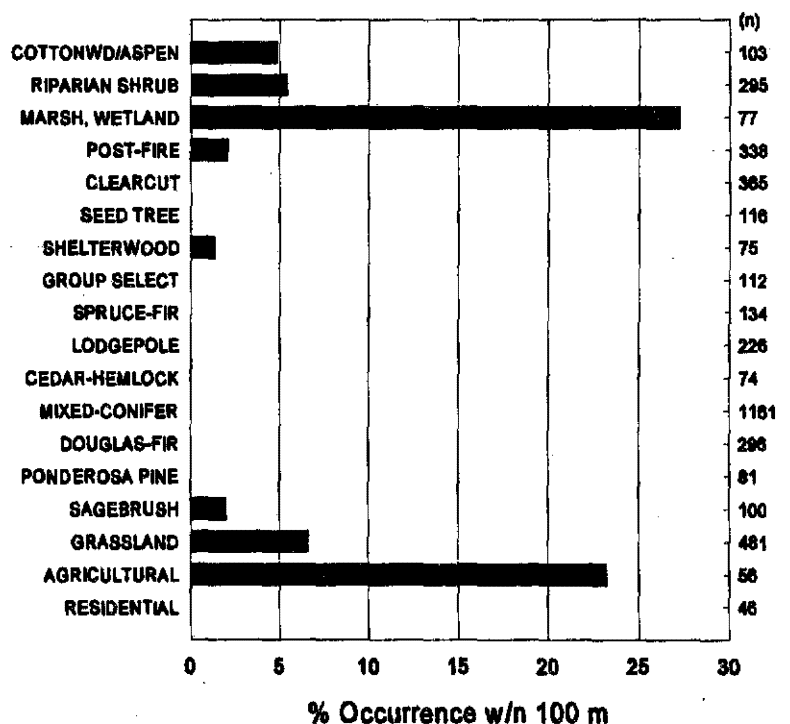
Red-winged Blackbird

Distribution and habitat use. Red-winged Blackbirds occur throughout the region (see map to right), and are restricted to marshlands and wet agricultural lands (see histogram below).



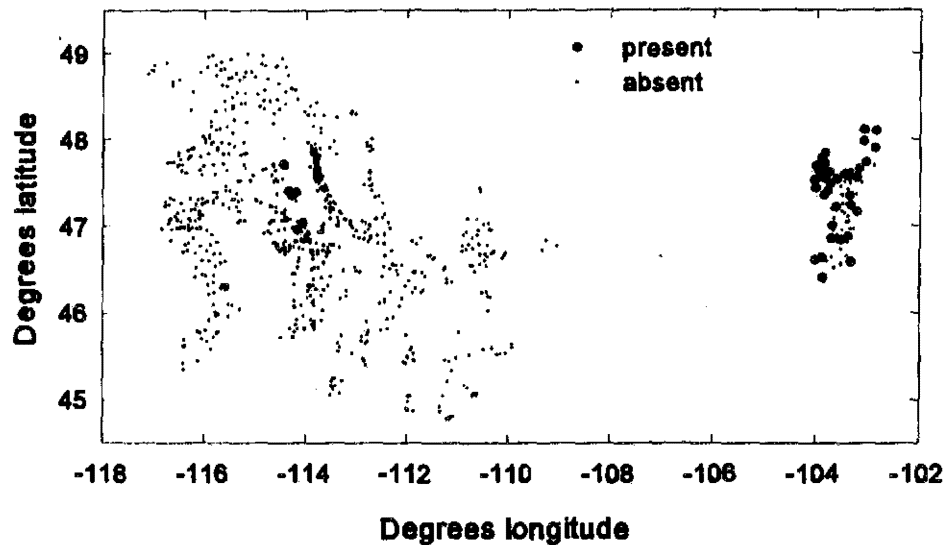
Management Considerations.

The main concern for this species is probably loss of habitat per se through draining of wetlands and conversion to agricultural uses.

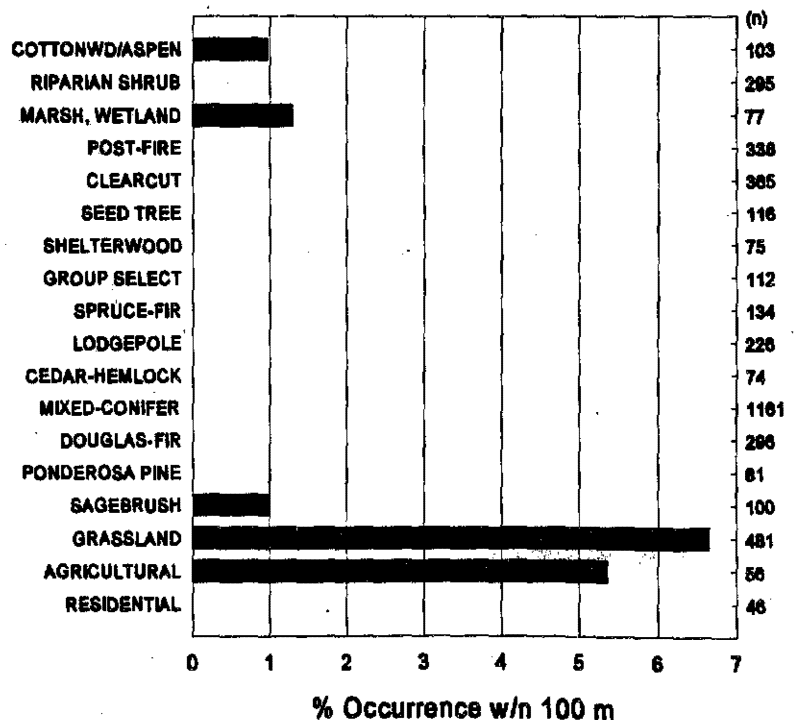


Ring-necked Pheasant

Distribution and habitat use. Ring-necked Pheasants are distributed throughout the region (see map to right), where they are entirely restricted to agricultural areas and woody draws in grasslands near such activity (see histogram below).

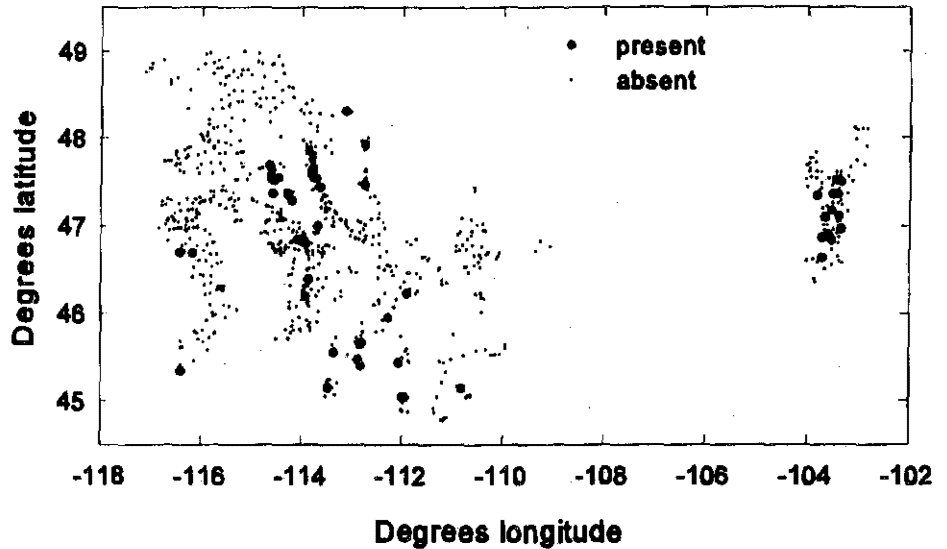


Management Considerations.
None suggested by the data.



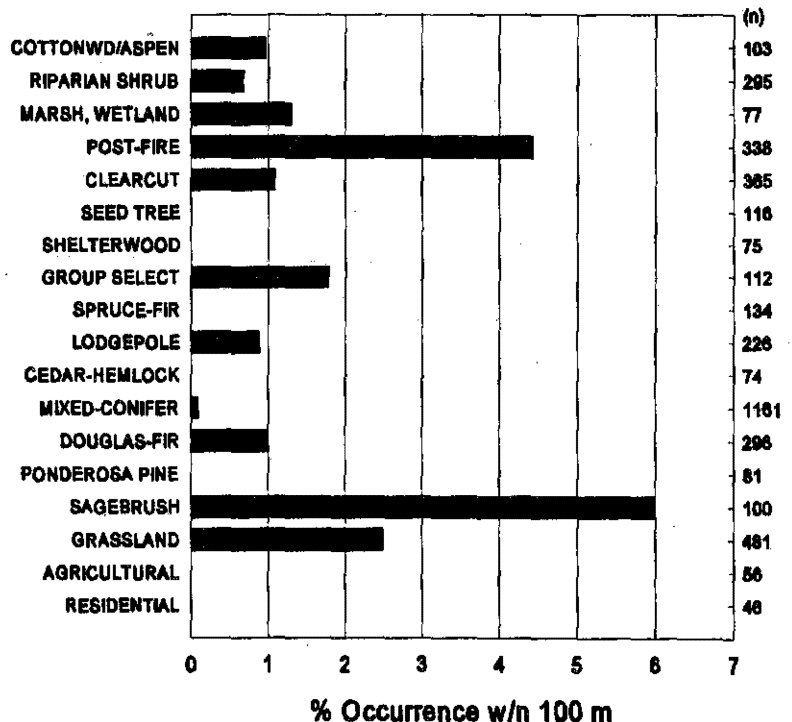
Rock Wren

Distribution and habitat use. Rock Wrens are distributed throughout the region (see map to right), and are especially common in rocky areas within open grasslands, sagebrush, and even burned forests (see histogram below).



Management Considerations.

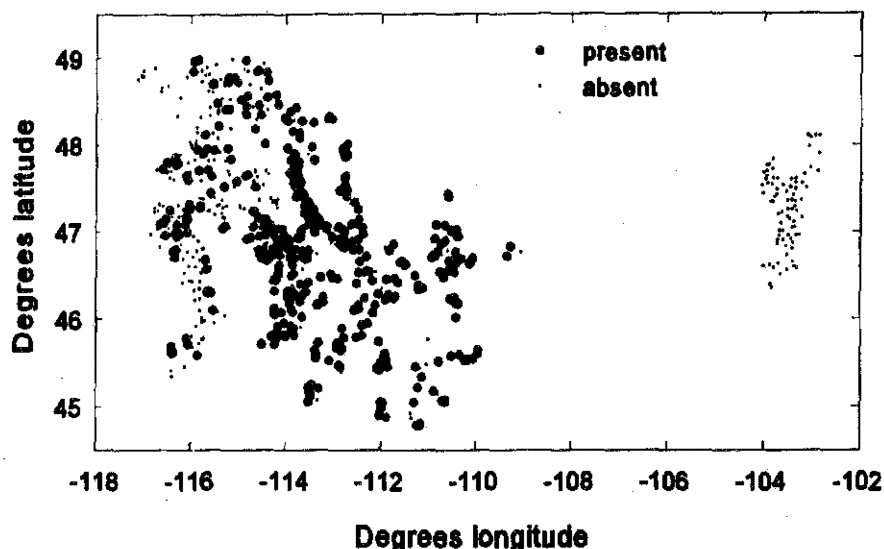
I'm not sure why burned forests are more likely to be occupied than unburned forests, but the data speak for themselves. I suspect that the species would not be affected, however, by post-fire salvage activity like other fire-dependent species might be. Probably no real management concern here.



Ruby-crowned Kinglet

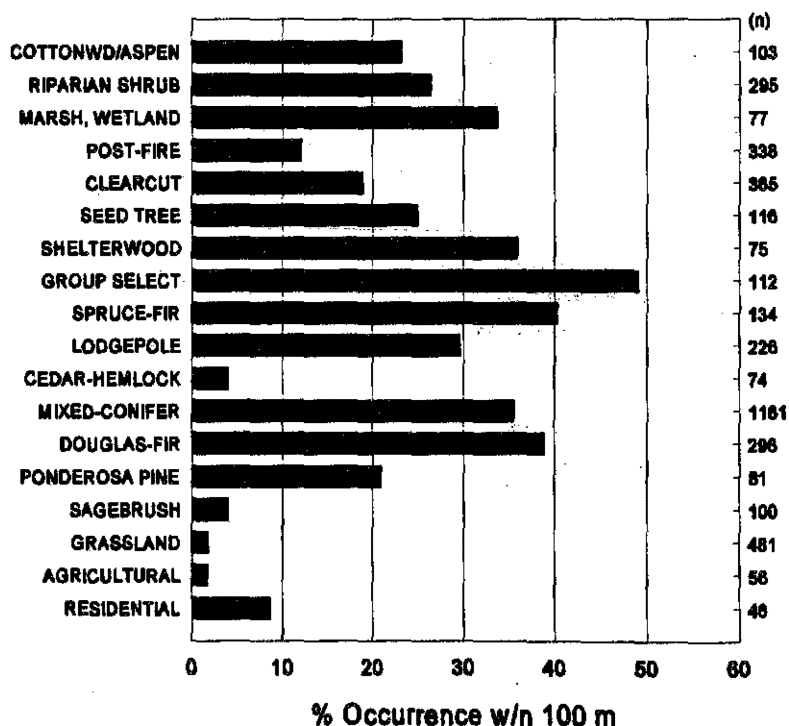
Distribution and habitat use.

Ruby-crowned Kinglets are widely distributed throughout the middle portion of the region (see map at right). The species is restricted to conifer forest cover types (see histogram below). The fact that this kinglet is less likely to occur on points with riparian cover near (20.3% occurrence) than on points without such cover near (24.1%) suggests that its apparent abundance in the riparian cover types is an artifact of the bird being detected in nearby forest types, and not that the bird is common in riparian cover types, per se.



Management considerations.

Despite its widespread occurrence across most conifer forest types, including the harvested types, it is noteworthy that this species shows a continuous decrease in abundance with increasing amounts of timber removed (see histogram). Thus, it is a species that is sensitive to timber harvesting in the same way that the Red-breasted Nuthatch is. For whatever reason, this species probably needs an abundance of trees to attain normal population levels.

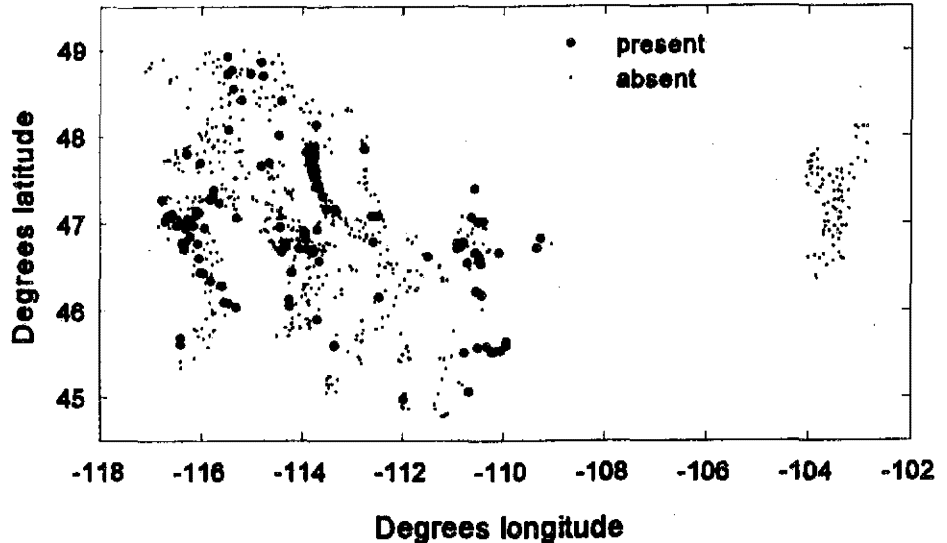


Ruffed Grouse

Distribution and habitat use.

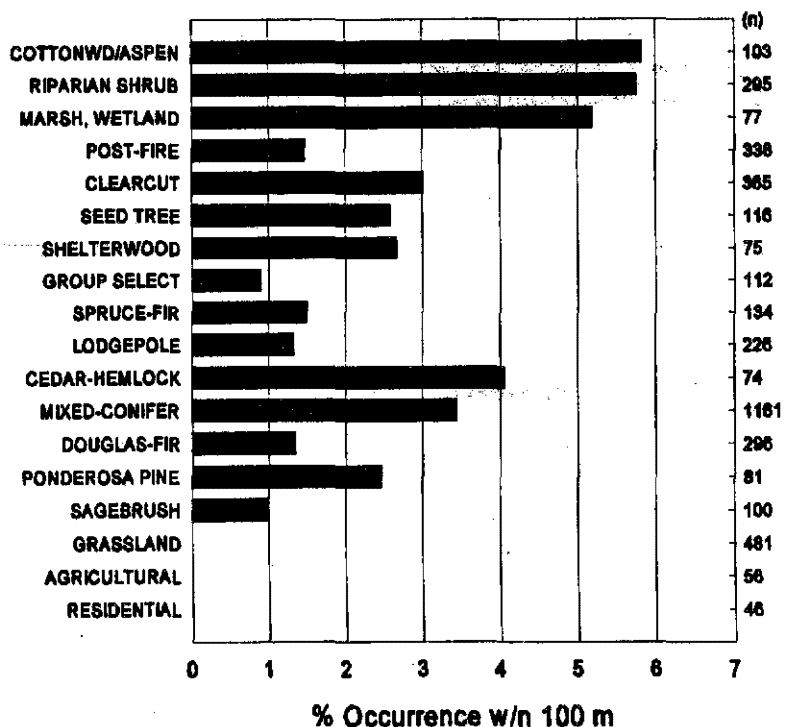
Ruffed Grouse are restricted to the western portion of the region (see map to right), where they occur exclusively in riparian streamside and riparian bottomland habitats (see histogram below). I cannot imagine why this species is recorded from such a variety of cover types after we cut the "edge" points out unless observers

detected the species (booming) but failed to detect the streamside riparian habitat that it most assuredly was booming from!



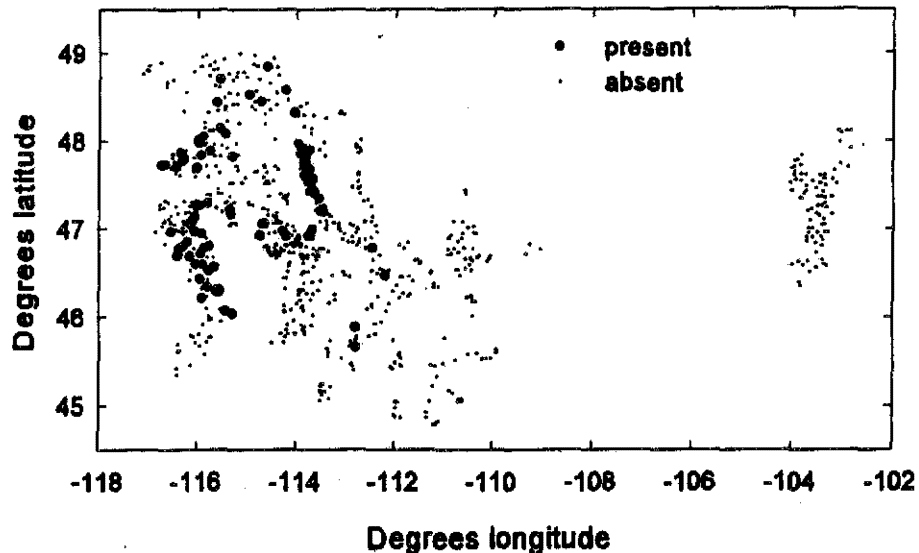
Management Considerations.

Because this species is relatively restricted to riparian corridors, the main concern should be one of whether our riparian management practices are compatible with its needs. We could use some nest success data in relation to alternative streamside management scenarios (especially cattle grazing, which may, through mechanical damage, remove the cover needed for suitable display sites).



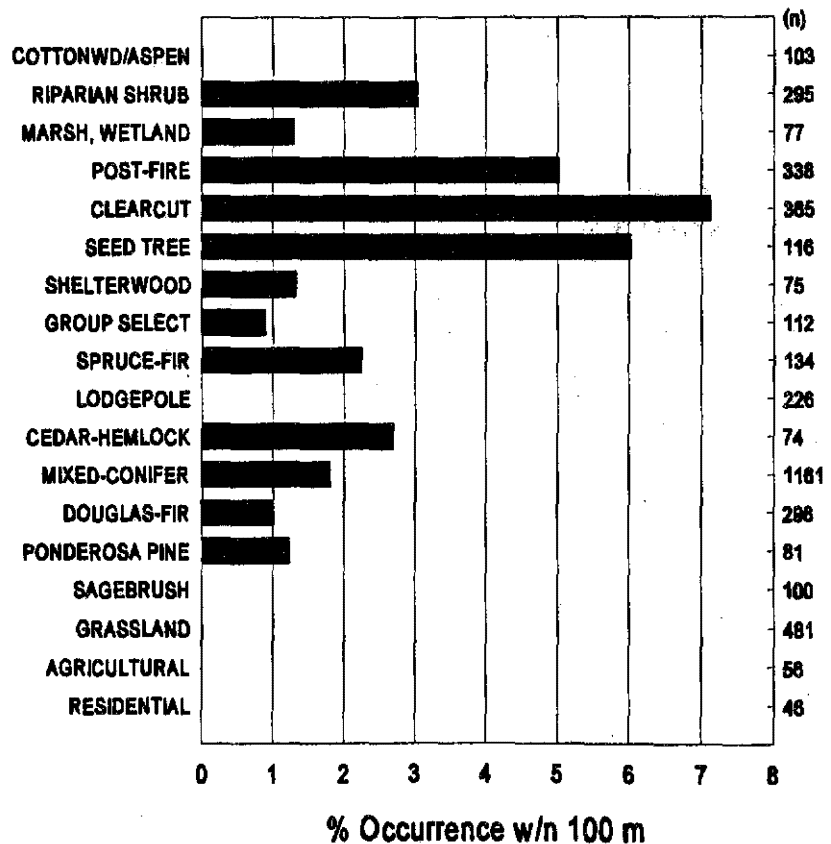
Rufous Hummingbird

Distribution and habitat use. Rufous Hummingbirds are restricted to the western portion of the region (see map to right). This species is relatively restricted to early post-fire situations (after shrubs have returned), but also occurs commonly in more heavily cut forests (see histogram below).



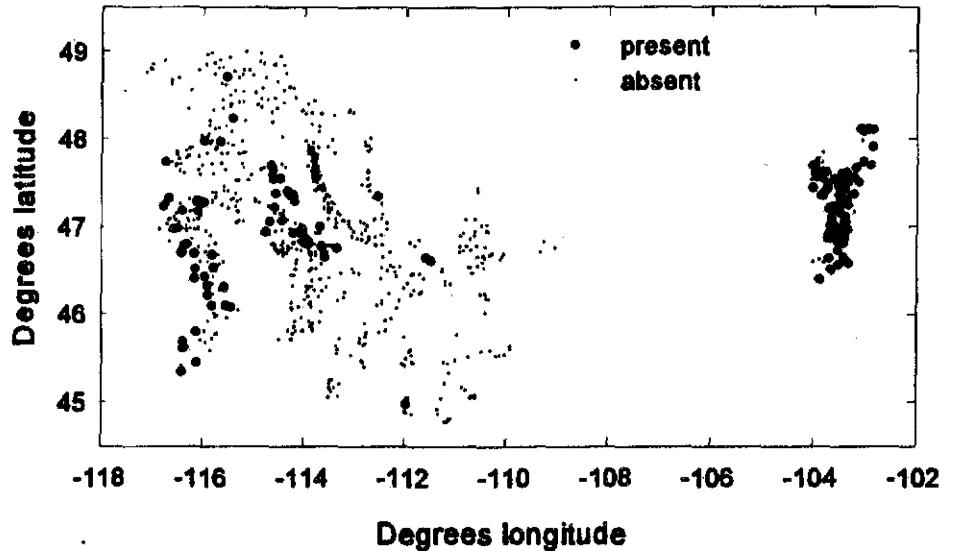
Management Considerations.

The main management concern here lies with whether the nesting success of birds that use the artificially created forest types (clearcuts and seed-tree cuts) are comparable with nest success in the naturally occurring early successional post-fire habitat. If not, the harvested types would be acting as "ecological traps" by attracting the birds, but then failing to provide other necessary resources.

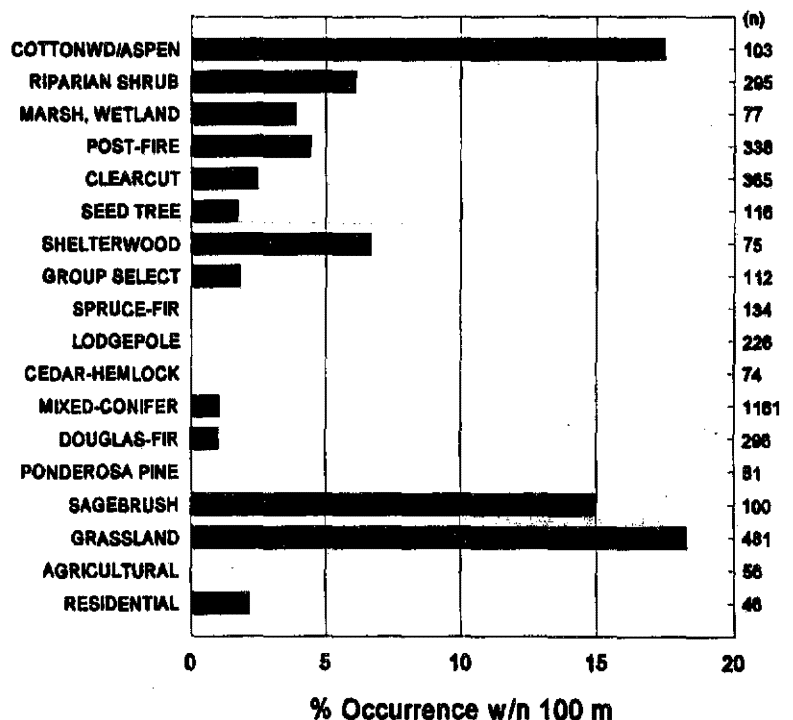


Rufous-sided Towhee

Distribution and habitat use. Rufous-sided Towhees are distributed throughout the region (see map to right), where they frequent the drier, brushy areas within riparian bottomlands and the brushy draws in open rangelands (see histogram below).

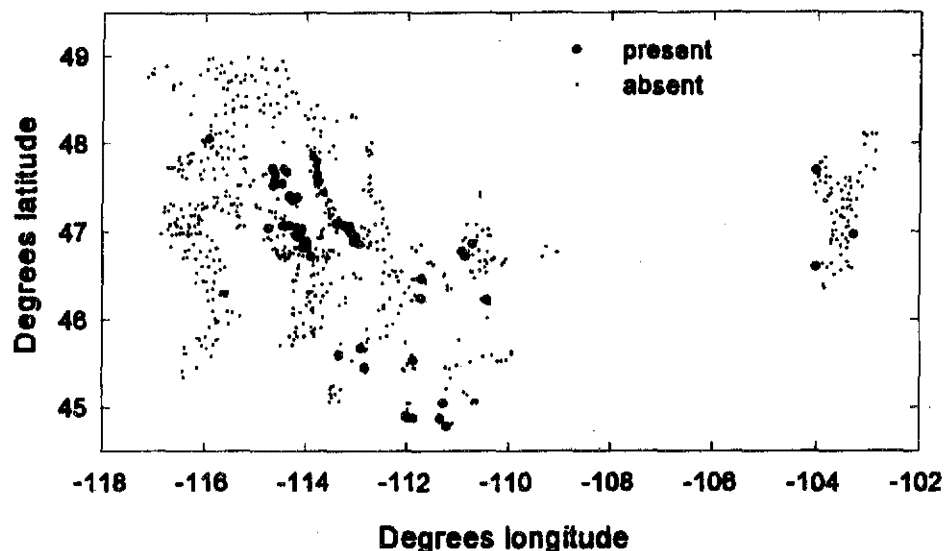


Management Considerations.
None suggested by the data.



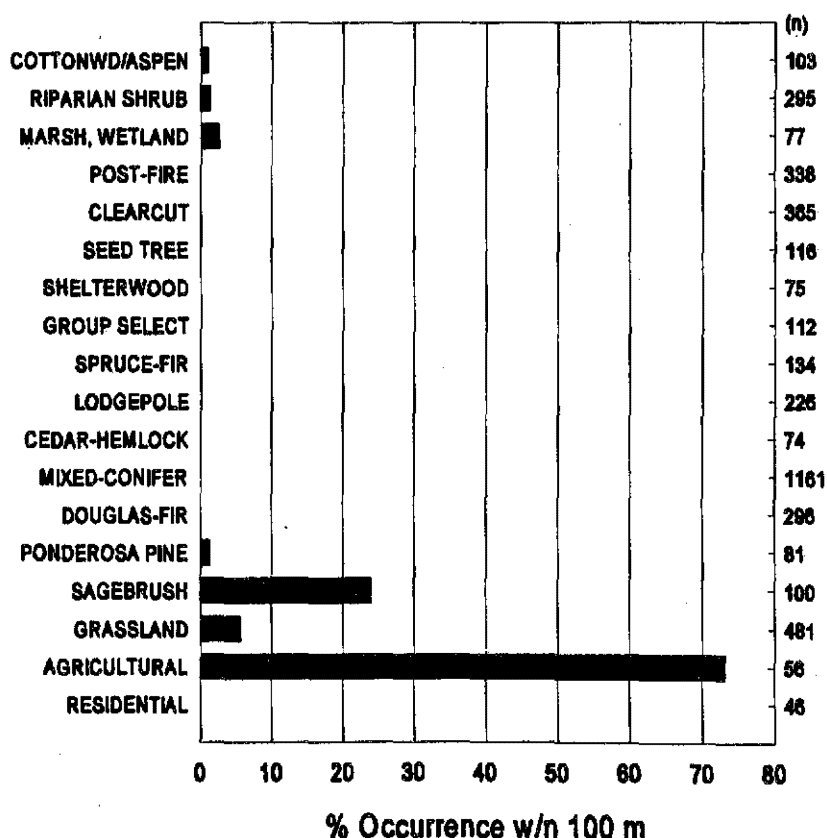
Savannah Sparrow

Distribution and habitat use. Savannah Sparrows are distributed throughout the region (see map at right), but they are relatively restricted to agricultural fields (see histogram below).



Management Considerations.

This is the only species that is relatively restricted to agricultural fields. Such a distribution would seem to beg for information on how well they do in terms of reproductive success. If poorly (because of mechanical disturbance from farming activity, for example), then such fields would be acting as "ecological traps", especially since a disproportionately large segment of the bird population may be using such conditions.

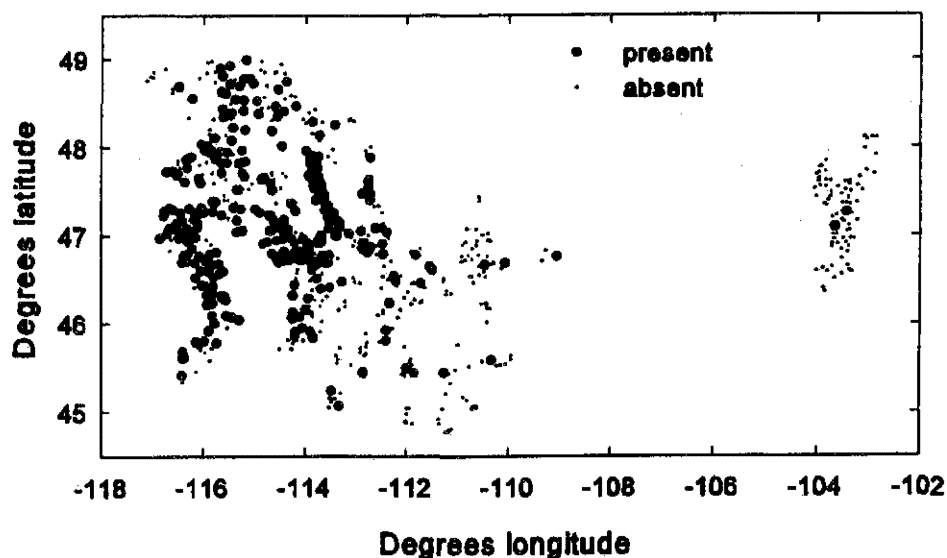


Solitary Vireo

Distribution and habitat use.

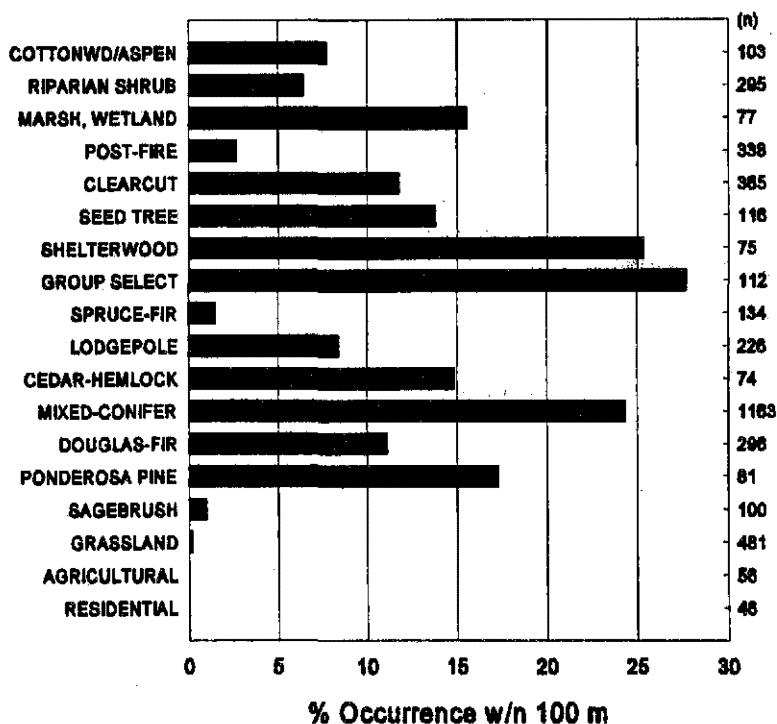
The Solitary Vireo is widespread throughout the westernmost portions of the region (see map). The species is restricted to coniferous forest cover types (see histogram), and is not uncommon in the harvested forest types.

Most occurrences in the riparian cover types are probably because the birds were detected in adjacent forest, as suggested by the fact that they are less likely to occur on points with (8.5% occurrence) than on points without (12.3% occurrence) riparian cover nearby.



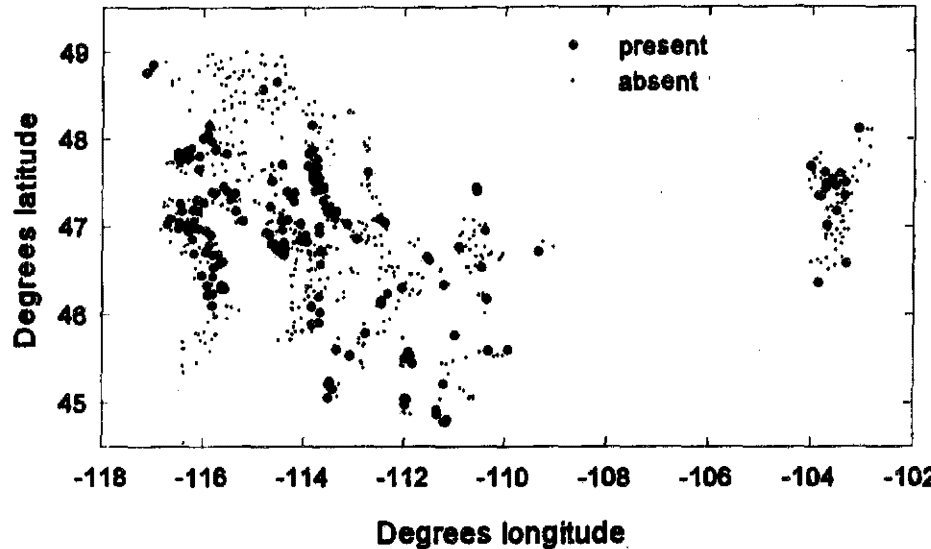
Management considerations.

Although the Solitary Vireo is common in the moderately cut forest types (group selection and shelterwood cuts), its occurrence drops off continuously with increasing levels of tree removal. This is the same pattern exhibited by several other forest bird species, including Ruby-crowned Kinglet, Red-breasted Nuthatch, and Townsend's Warbler, and it implies a certain degree of dependence on the retention of some older, relatively uncut conifer forests.



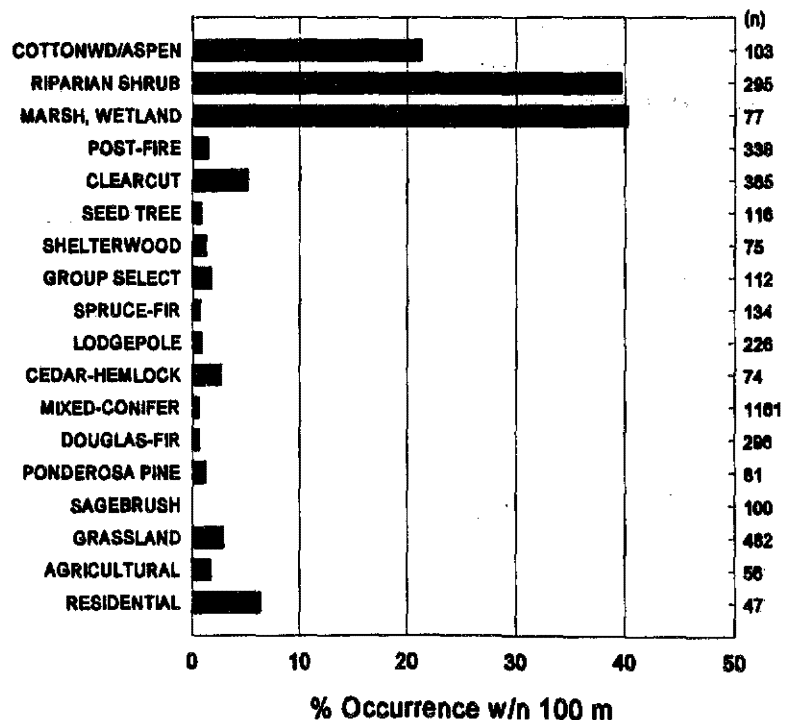
Song Sparrow

Distribution and habitat use. Song Sparrows are distributed throughout the region (see map at right). They are relatively restricted to riparian streamsides, bottomlands, and marshlands (see histogram below).



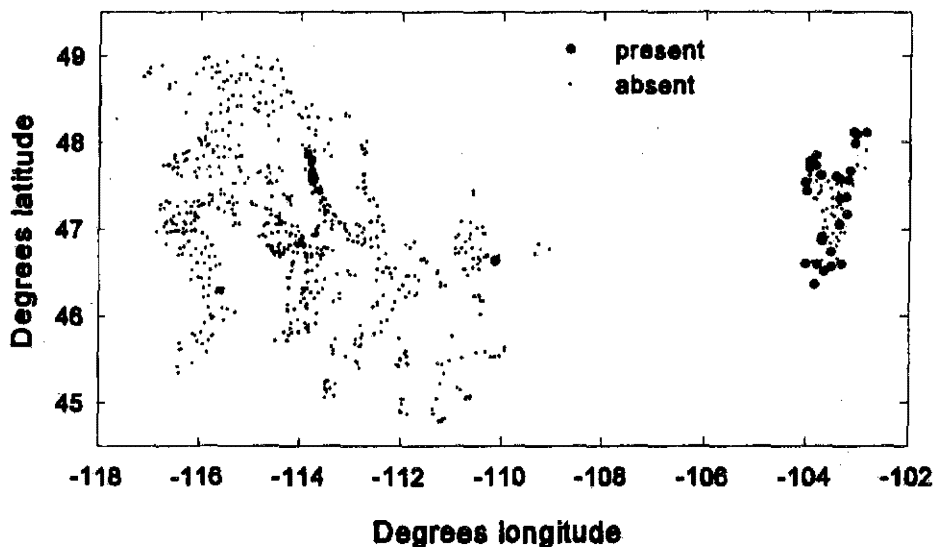
Management Considerations.

This is another species that may be sensitive to streamside management practices and would, therefore, serve as a good indicator of whether "best management practices" are really serving the needs of wildlife species.



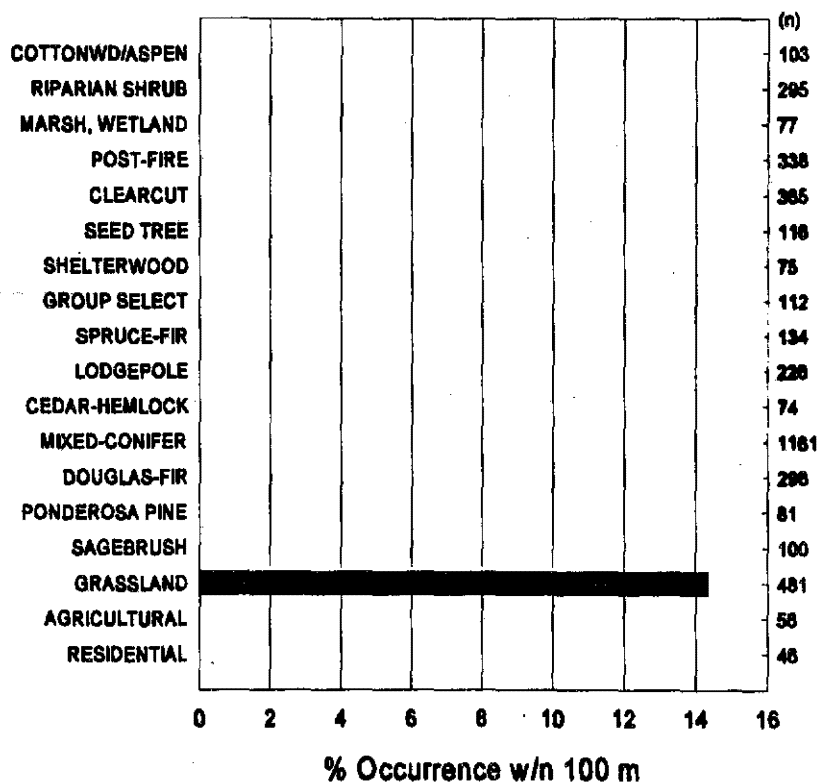
Sprague's Pipit

Distribution and habitat use. Sprague's Pipit is restricted to the eastern portion of the region (see map to right), where it is entirely restricted to grasslands (see histogram below).



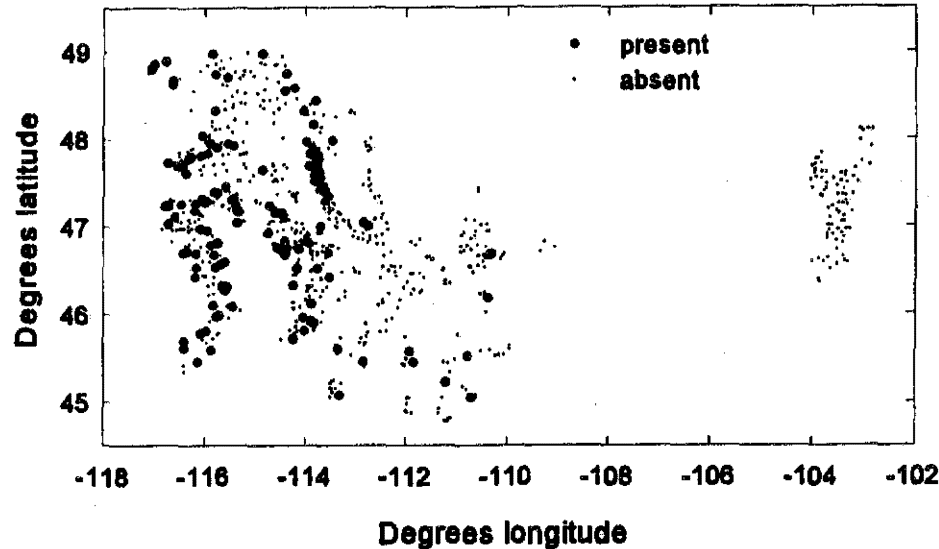
Management Considerations.

A species cannot get much more specialized in its habitat distribution than this! It is critical that we look at how alternative land-use practices in grasslands affect the probability of occurrence and nest success of this species; any negative impacts could have significant consequences because it occurs in no other cover type.



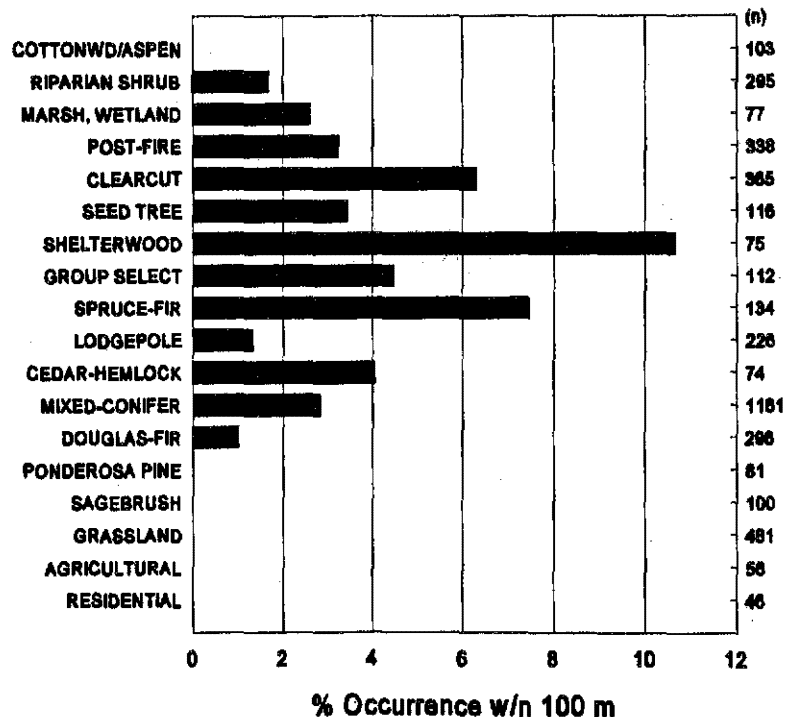
Steller's Jay

Distribution and habitat use. Steller's Jay is a bird of the westernmost portion of the region (see map at right). It occurs primarily in higher elevation spruce-fir forests (see histogram below), where it is six times more likely to occur on points with dead/down than on points without such. It is common in a variety of harvested forest type as well.



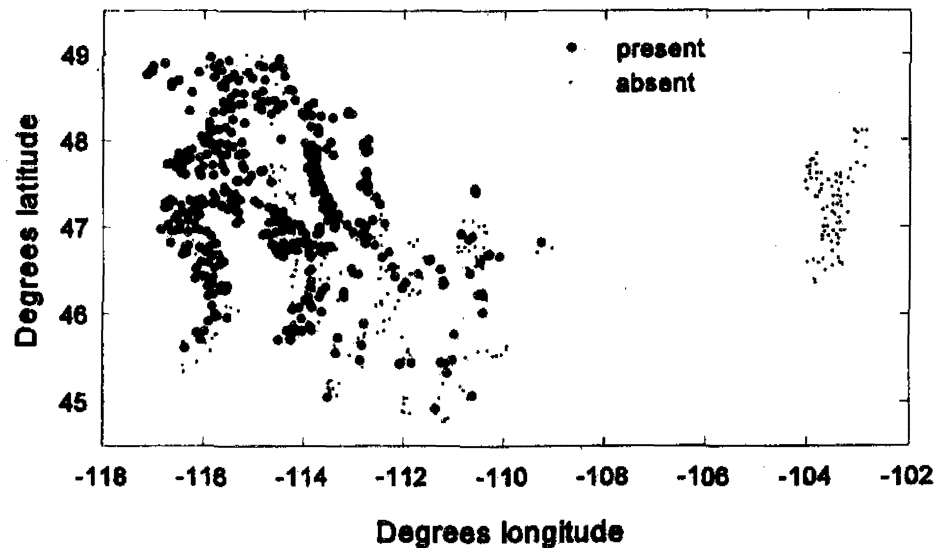
Management Considerations.

Although this species appears to be reasonably abundant in harvested forests, I suspect that nesting activity is limited there. Instead, I suspect that this wide-ranging species frequents such areas for other reasons (nest egg predation?) and that its primary nesting habitat is in the less disturbed forest. This species may be a big reason why nest success of other songbirds might not be as great as implied by census data alone, and underscores the need for nest success studies in cut forests.



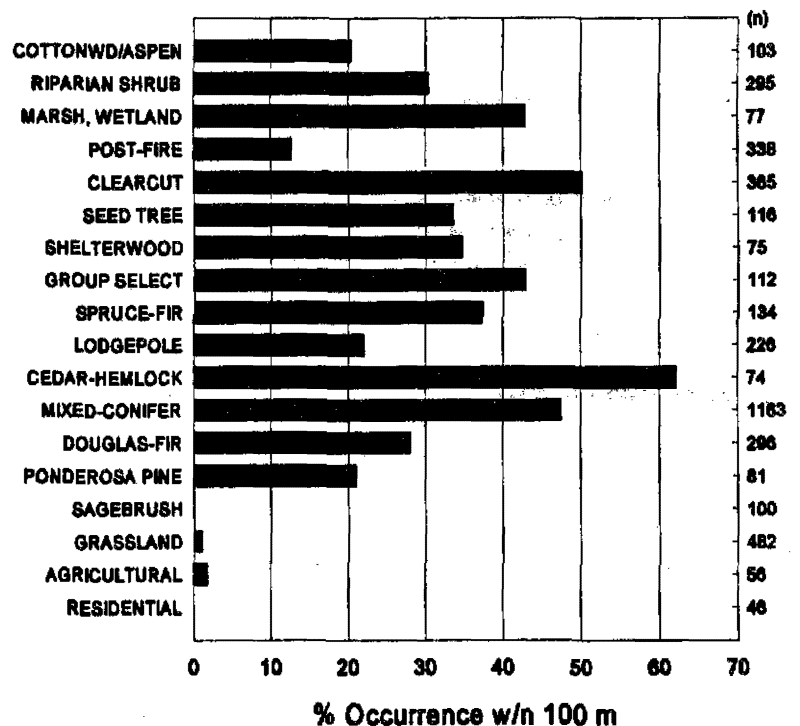
Swainson's Thrush

Distribution and habitat use. Swainson's Thrush is restricted to the western part of the region (see map). This species is strongly associated with the understory shrub layer in conifer forests, so it appears to do well in both the moister, relatively uncut forest types and the early successional stages following timber harvest.



Management considerations.

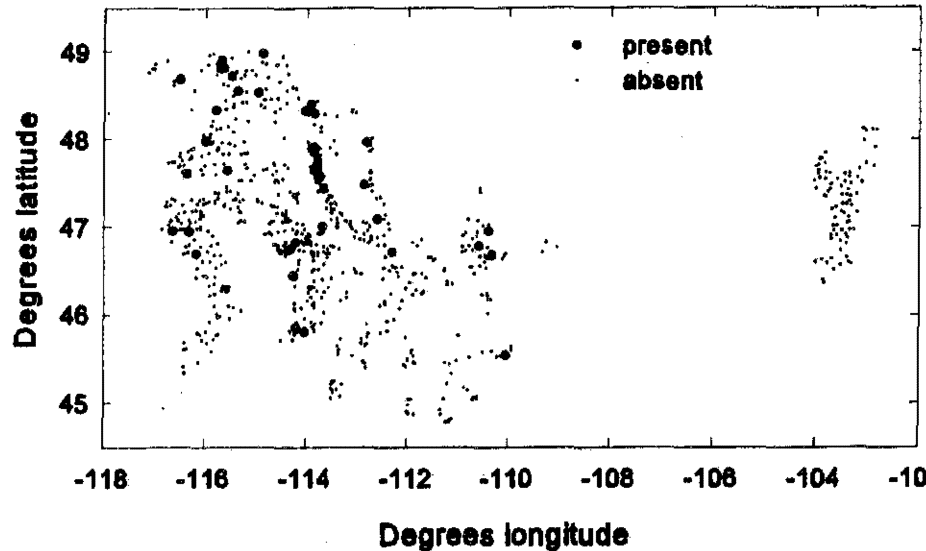
The only potential issue that I see is whether nest success is as good as suggested by the census data from harvested forest types. This appears to be a bird species of little management concern otherwise.



Three-toed Woodpecker

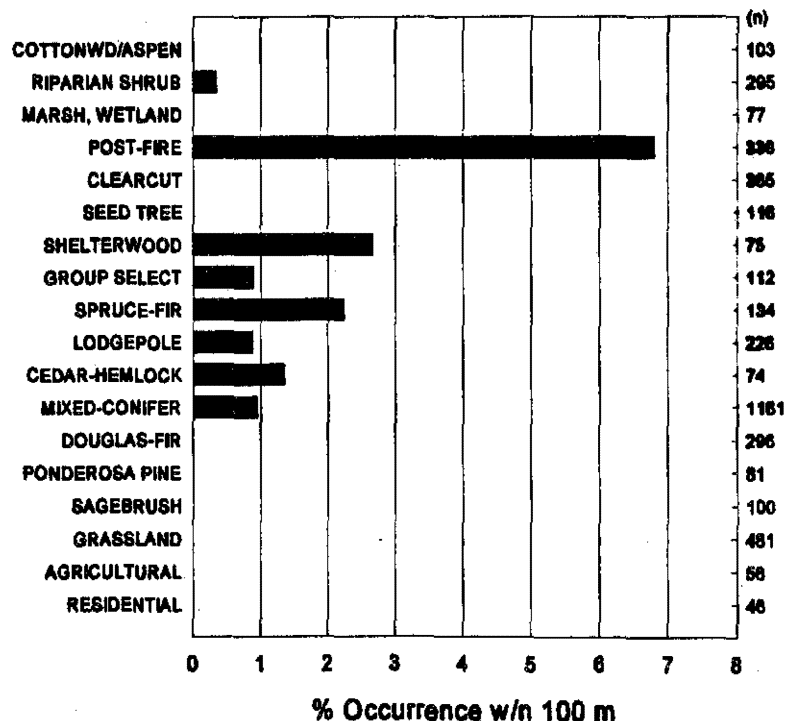
Distribution and habitat use. Three-toed Woodpeckers are restricted to the western part of the region (see map at right). This species is clearly associated with post-fire habitat (see histogram below), but is not quite as restricted to such conditions as the Black-backed Woodpecker.

Nonetheless, the data speak for themselves; if you want to detect a Three-toed Woodpecker, you're 5 times more likely to do so in a burned forest than most anywhere else.



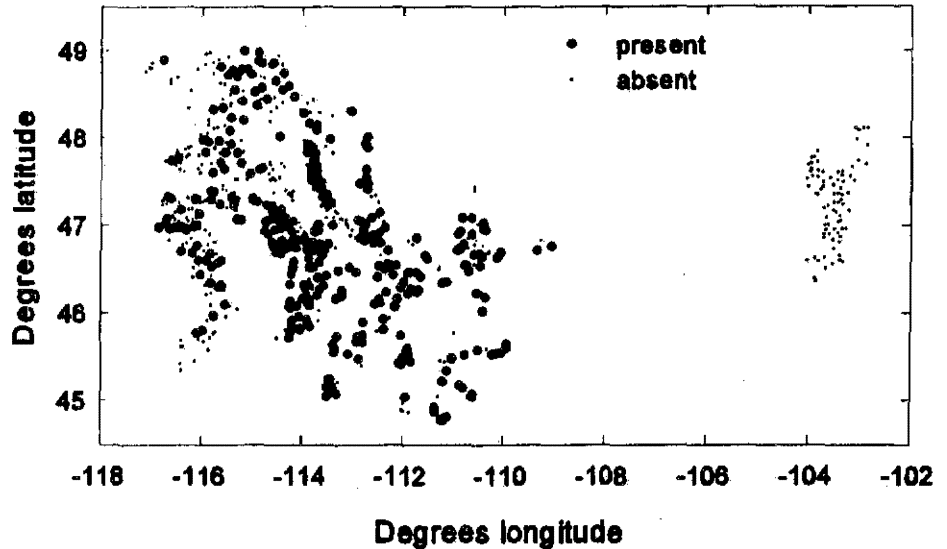
Management considerations.

The implications of its habitat distribution should be abundantly clear: Three-toed Woodpeckers are relatively restricted to post-fire conditions, where they rely on standing dead timber for feeding and nesting purposes. Post-fire salvage logging is an activity that is clearly in conflict with the needs of this species.



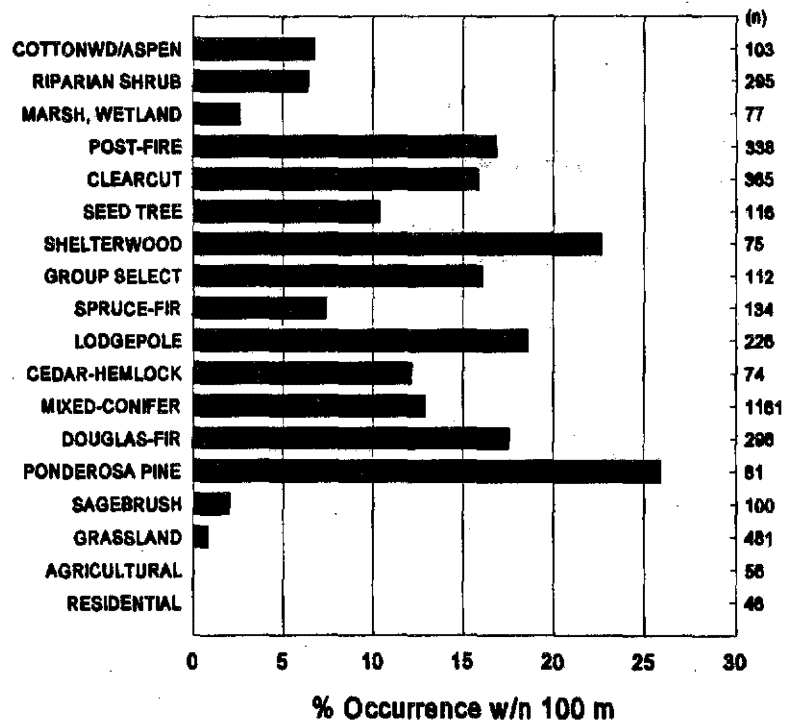
Townsend's Solitaire

Distribution and habitat use. Townsend's Solitaire is restricted to the western portion of the region (see map at right), where it occurs commonly in both cut and relatively uncut conifer forests (see histogram below).



Management Considerations.

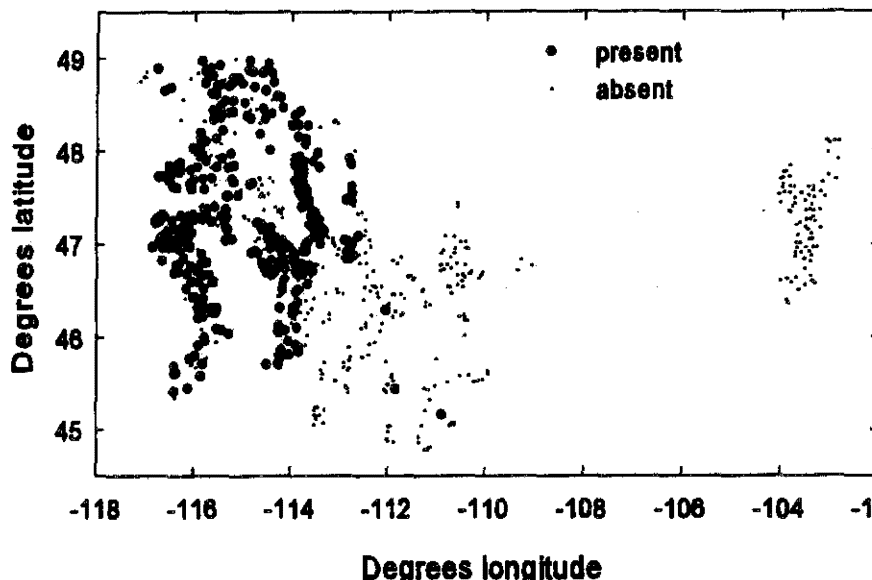
The only potential issue that I see is whether nest success is as good as suggested by the census data from harvested forest types. This appears to be a bird species of little management concern otherwise.



Townsend's Warbler

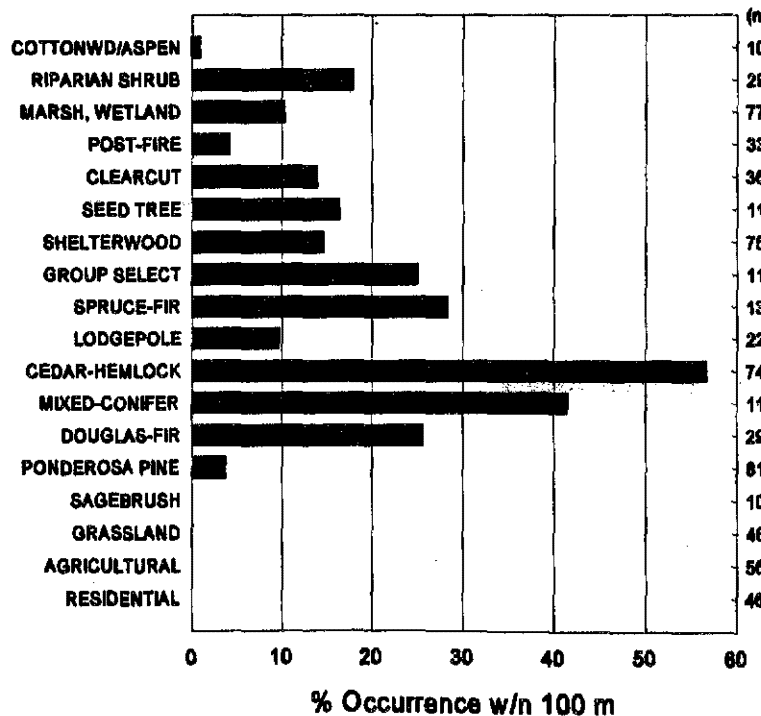
Distribution and habitat use.

Townsend's Warbler is restricted to the westernmost part of the region (see map at right), and is restricted to coniferous forest cover types as well (see histogram below). In addition, Townsend's Warbler is notably less abundant in the drier and more open forest cover types, and in forest patches that have been harvested. In fact, many of the records from cut forest patches are probably a consequence of bird detections that originate from distant uncut forest types because the probability of detection from a point within a cut forest patch is twice as high when a forest edge is near. Its probability of occurrence differs significantly ($P < 0.001$) among count points that had no snags (14.9% occupied), a few snags (27.8% occupied), and lots of snags present within 10 m (29.8% occupied). The same pattern obtains with the amount of dead and downed material--Townsend's Warbler is nearly 5 times more common on points with a lot of dead and down versus those without any.



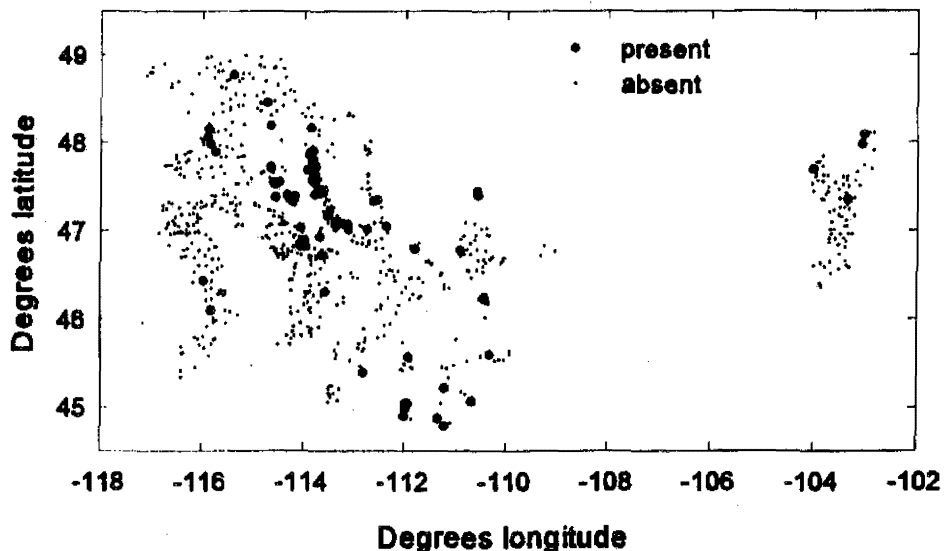
Management considerations.

Townsend's Warbler is probably one of the more sensitive species to timber harvesting activity, as evidenced by a continuous decline in probability of occurrence with increasing amounts of timber removed. An analysis of the size and landscape context of forest patches that are suitable for occupancy by Townsend's Warbler will have to await completion of the GIS vegetation database, but an area dependency is suggested by the fact that Townsend's Warbler is detected on points 17.8% of the time when the edge of another cover type is within 100 m and 24.3% of the time when no edge is near.



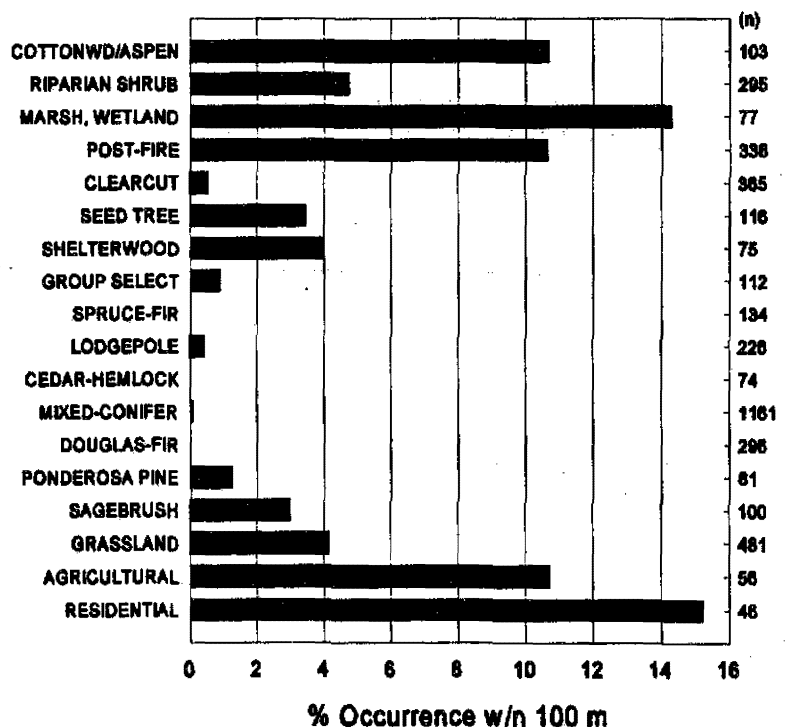
Tree Swallow

Distribution and habitat use. Tree Swallows are distributed throughout the region (see map to right), and are associated primarily with riparian bottomlands and nearby agricultural areas, and early post-fire forests (see histogram below).



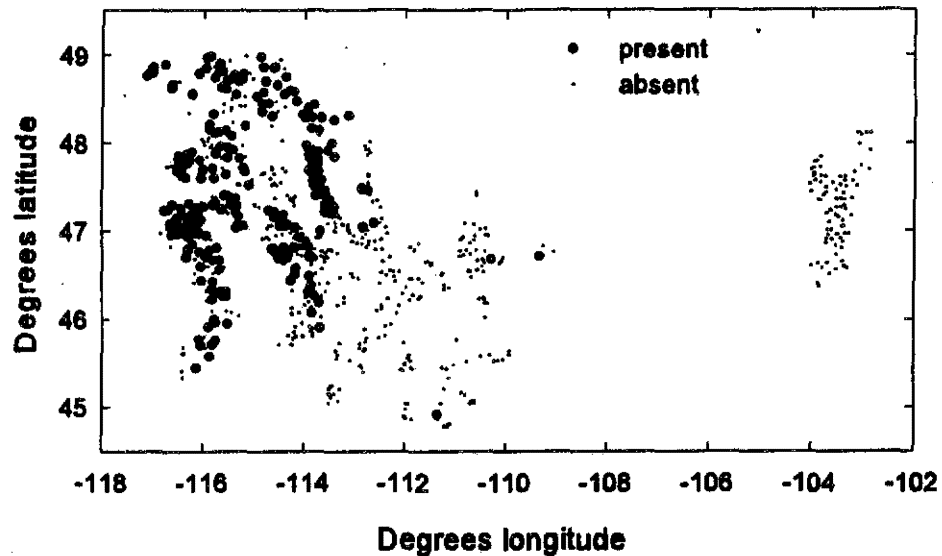
Management Considerations.

Considering that much of the abundance of Tree Swallows in agricultural, residential (rural), and grassland areas is an artifact of the proximity of artificial roadside nest boxes, the naturally occurring populations boil down to the top four cover types indicated on the histogram to the right. This, in turn, suggests two management issues: (1) the loss of nest trees in post-fire salvage sales may be detrimental to Tree Swallow populations, and (2) the presence of nest-usurping European Starlings in the bottomlands may also pose a special threat to this swallow species.

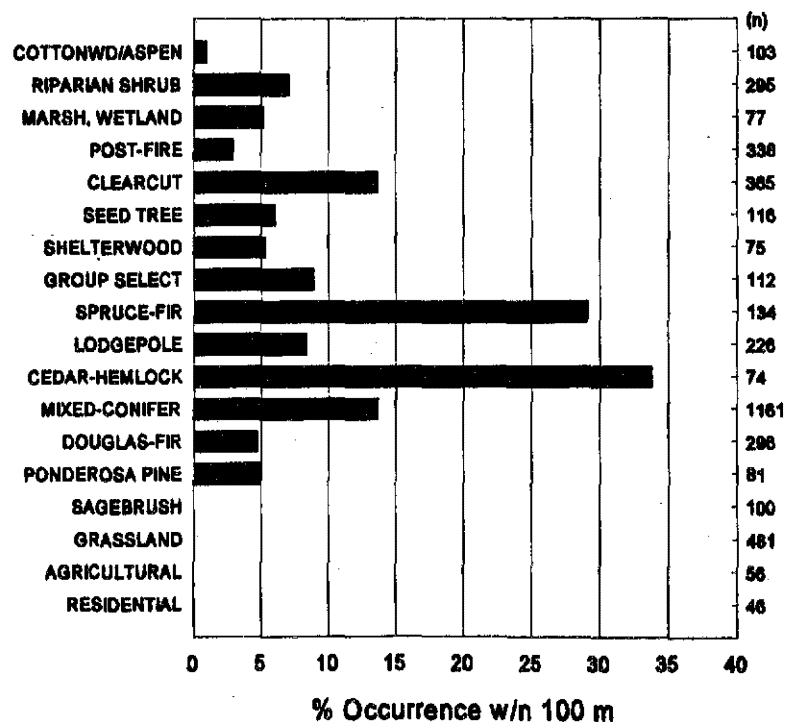


Varied Thrush

Distribution and habitat use. Varied Thrushes are restricted to the northwestern portion of the region (see map to right), where they are relatively restricted to uncut cedar-hemlock and spruce-fir forests (see histogram below).



Management Considerations. Although this species occurs in harvested forest types as well, the probability of detecting them is three times less than in the relatively undisturbed forest types. Thus, the maintenance of viable populations of this species may depend to some extent on the maintenance of some amount of older, relatively uncut conifer forest, especially cedar-hemlock and spruce-fir types.

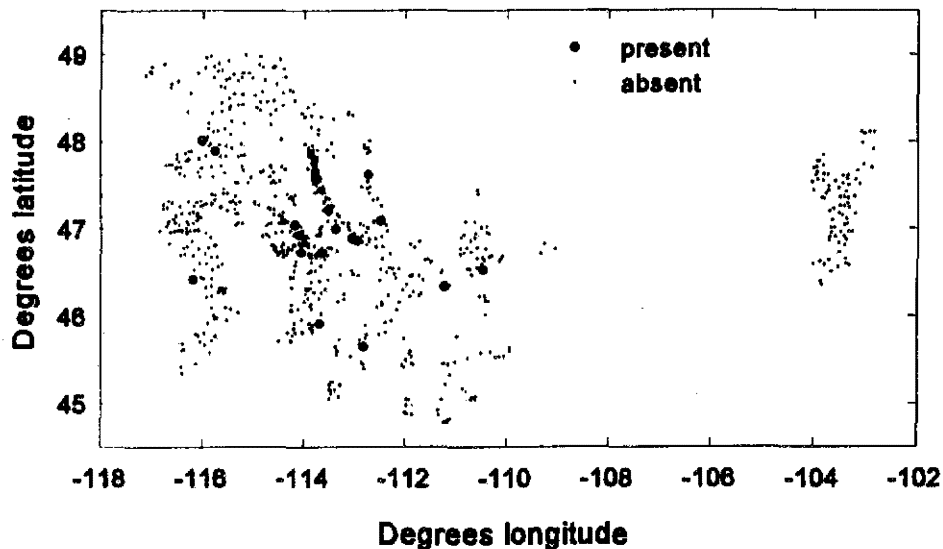


Veery

Distribution and habitat use.

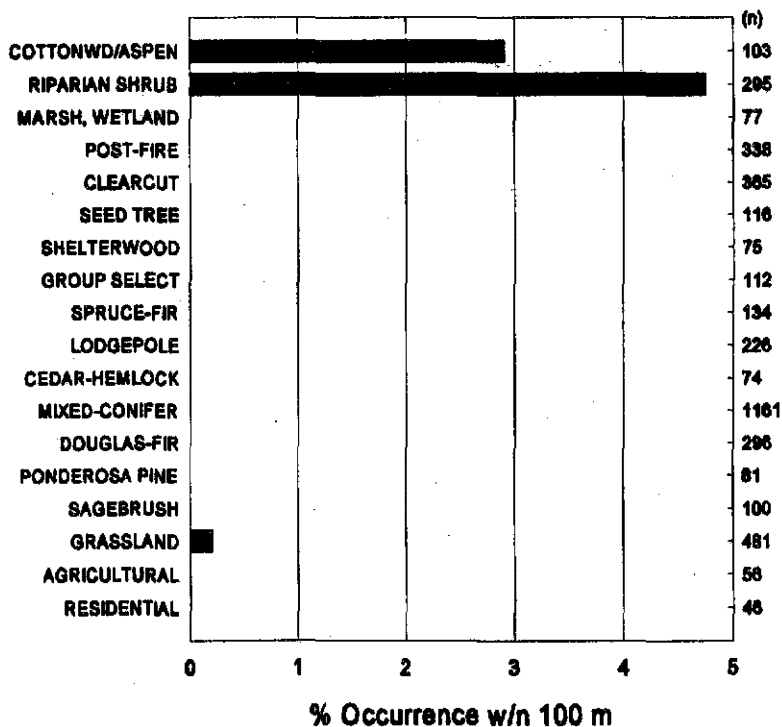
Veerys are restricted to the western portion of the region (see map to right). They occur exclusively in riparian bottomlands and streamside riparian situations with some large deciduous trees present.

They are replaced by Swainson's Thrushes in streamside riparian zones when at higher elevations where the large deciduous trees drop out, so many of the streamside occurrences are either mis-identifications of the bird or of the cover type.



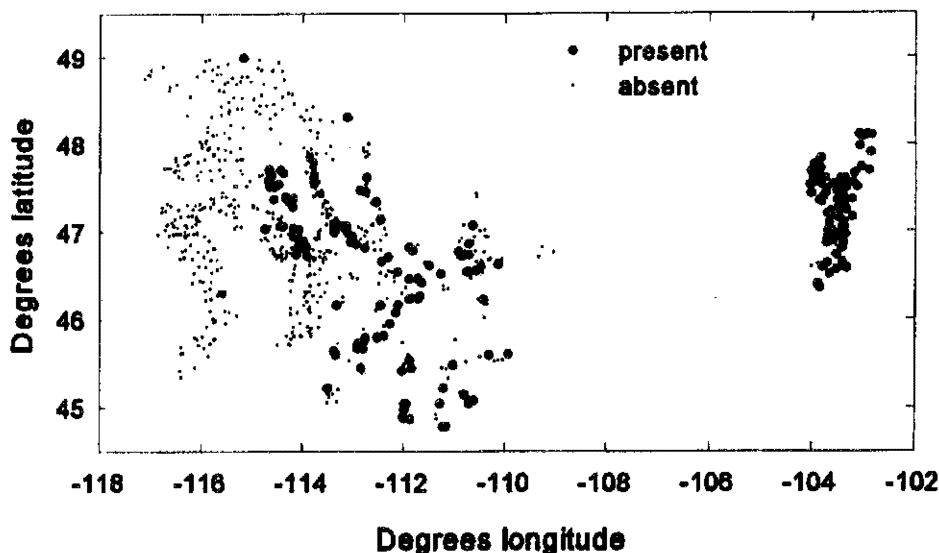
Management Considerations.

The Veery is a good indicator of riparian bottomland communities. Because of its restriction to such conditions, the impact of various streamside management practices is of interest. If nesting success in this species is negatively affected by grazing practices or cowbird parasitism rates, then this species is in trouble because it occurs in no other habitat.



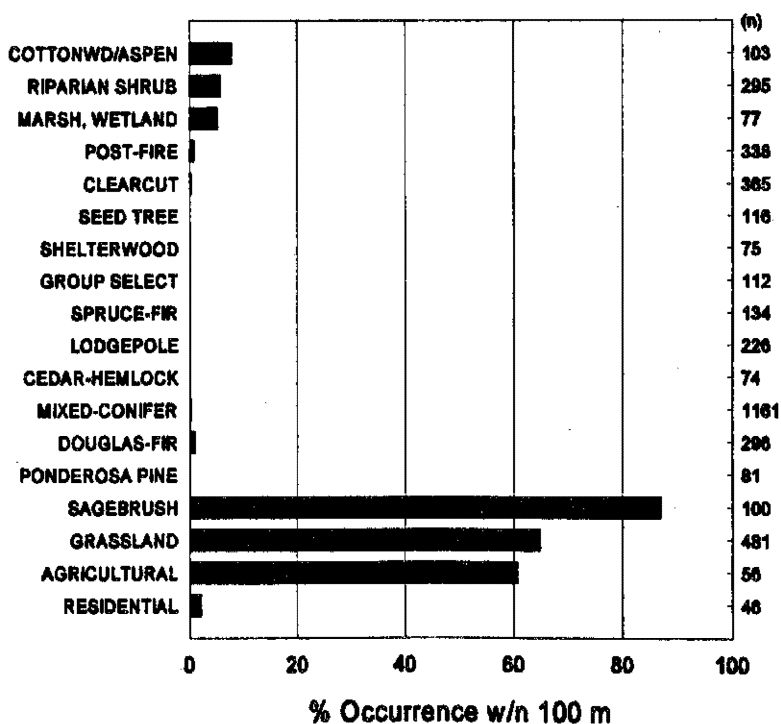
Vesper Sparrow

Distribution and habitat use. Vesper Sparrows are distributed throughout the eastern two-thirds of the region (see map to right). They occur exclusively in grasslands, sagebrush, and agricultural fields (see histogram below).



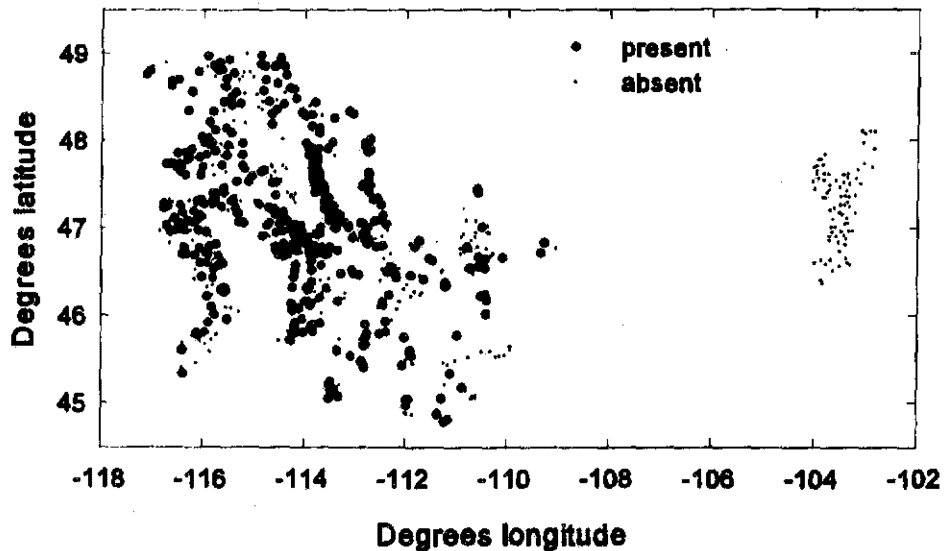
Management Considerations.

We desperately need information on the nesting success of this species under alternative management regimes in sagebrush and grassland habitats, and we need to know whether it breeds successfully in agricultural fields, or whether the potential mechanical damage associated with farm machinery makes this habitat an "ecological trap" for the species.



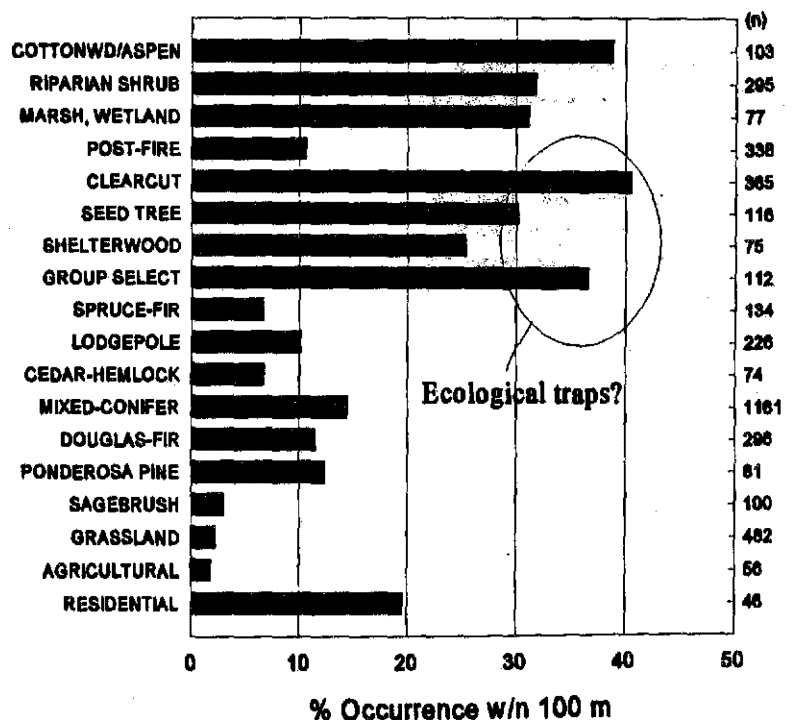
Warbling Vireo

Distribution and habitat use. Warbling Vireos are restricted to the western portion of the region (see map to right), where they are primarily associated with the shrub layer in riparian habitats (see histogram below). They occur equally commonly in harvested forest types, where they take advantage of the early successional "release" of shrub vegetation.



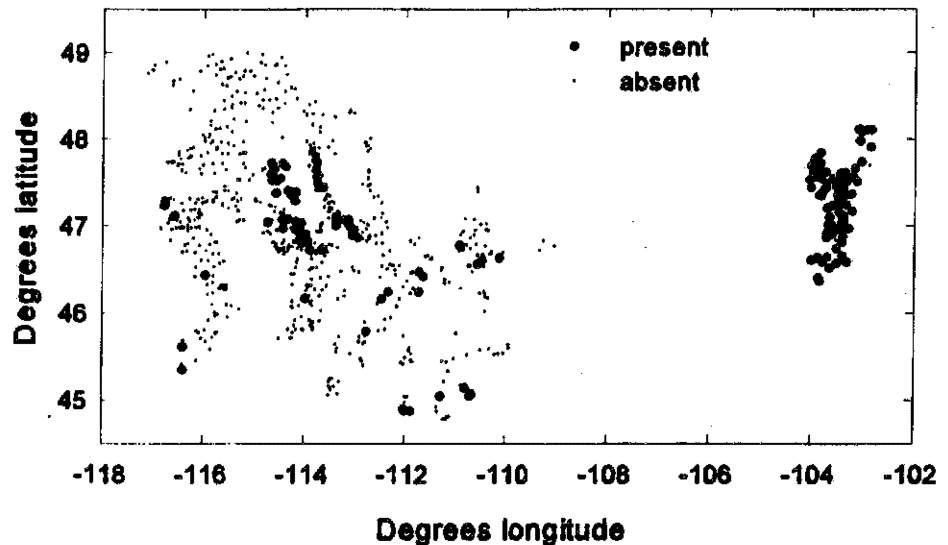
Management Considerations.

The abundance of this species in the cut forest types would make it appear to be in good shape. However, the area covered by cut forests is substantial compared with riparian habitat (the vireo's "natural" habitat), so the potential for substantial population effects is there if the birds are not reproducing as well as implied by the census data. This is another species that could be drawn into those artificially created forests and then not do well; we need data to test whether the cut forests are acting as "ecological traps".

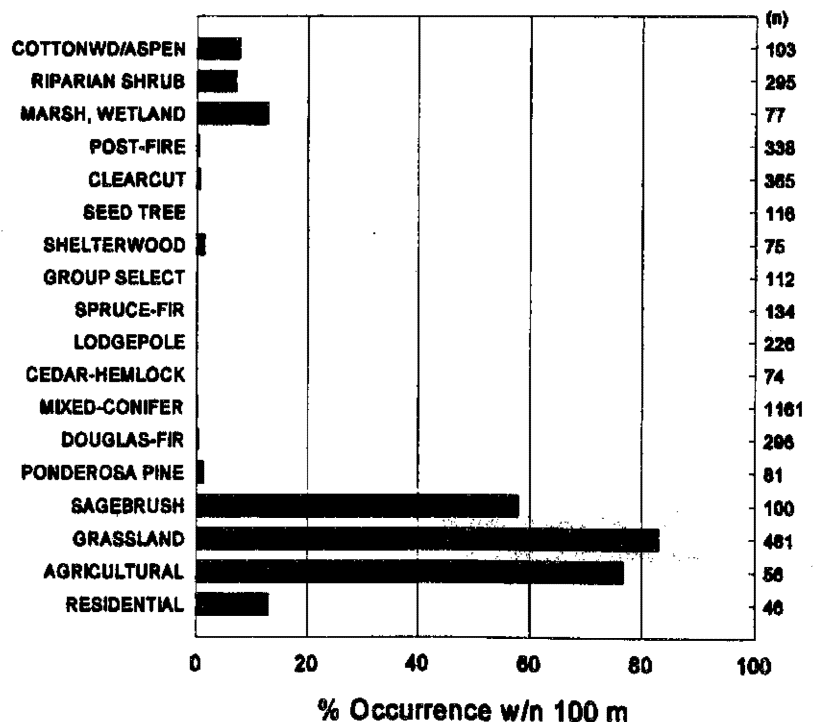


Western Meadowlark

Distribution and habitat use. Western Meadowlarks are distributed throughout the region (see map to right). They occur exclusively in grasslands, sagebrush, and agricultural fields (see histogram below).

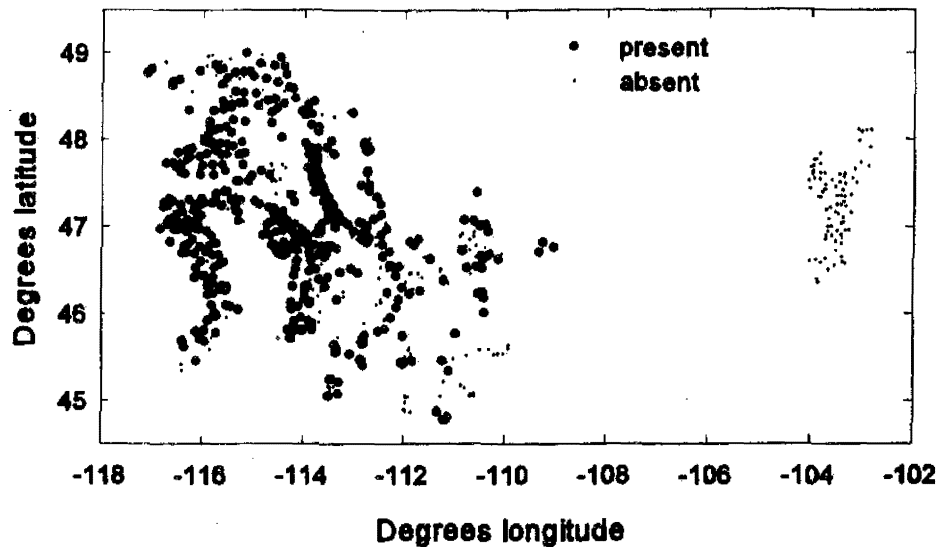


Management Considerations. We desperately need information on the nesting success of this species under alternative management regimes in sagebrush and grassland habitats, and we need to know whether it breeds successfully in agricultural fields, or whether the potential mechanical damage associated with farm machinery makes this habitat an "ecological trap" for the species.



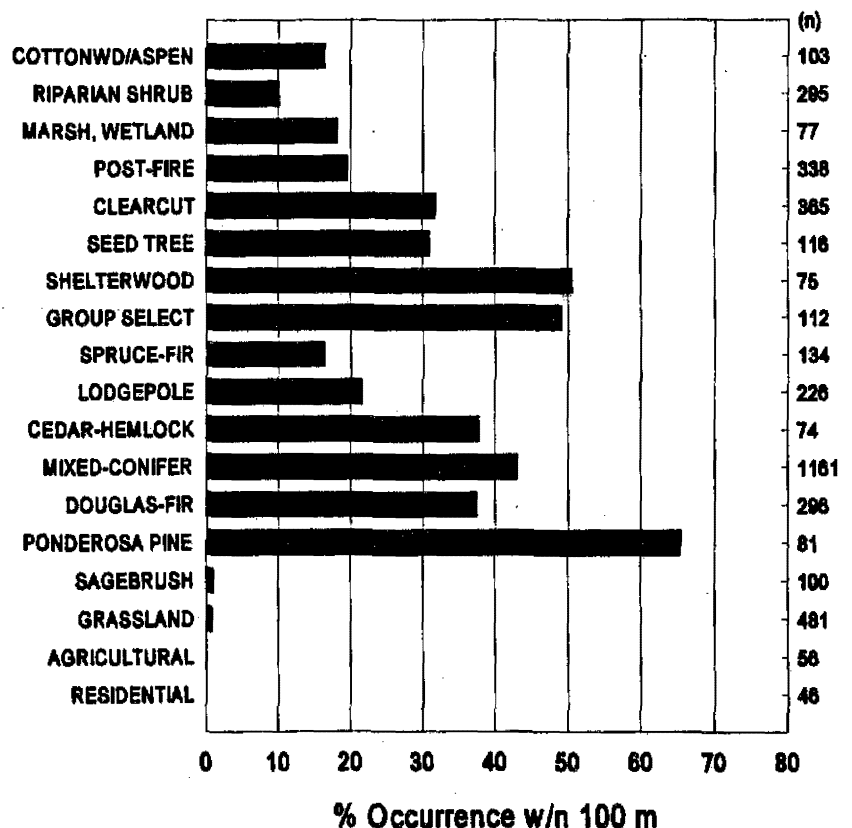
Western Tanager

Distribution and habitat use. Western Tanagers are restricted to the western portion of the region (see map to right), where they occur across a wide range of coniferous forest cover types (see histogram below). They are most common in the lower elevation and drier forest types, especially ponderosa pine and the harvested forests with a relatively large number of green trees left.



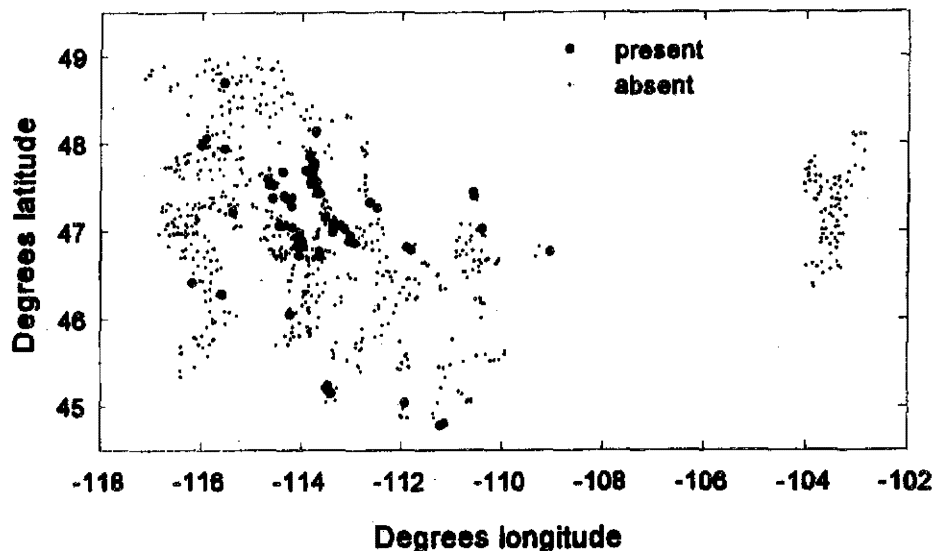
Management Considerations.

Because tanagers are widespread across all coniferous forest types, there is probably not much of management concern here. The issue of primary importance is whether their relatively high abundance in harvested forest types reflects the suitability of those types or not. In many respects, shelterwood and group selection cuts are "unnatural", so there is a possibility that birds are drawn to those sites because of their superficial similarity to some naturally occurring cover type, but that other necessary requisites are missing such that reproductive success is compromised.



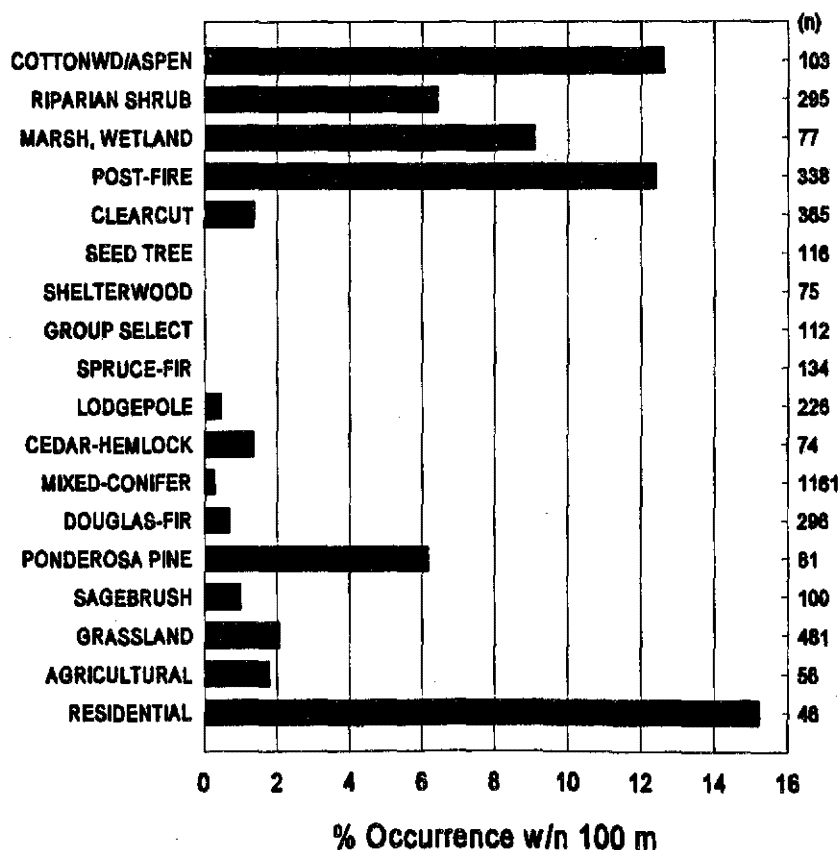
Western Wood-Pewee

Distribution and habitat use. Western Wood-Pewees are restricted to the western portion of the region (see map to right), where they occur primarily in cottonwood bottomlands, tree-lined residential areas, and post-fire forests (see histogram below).



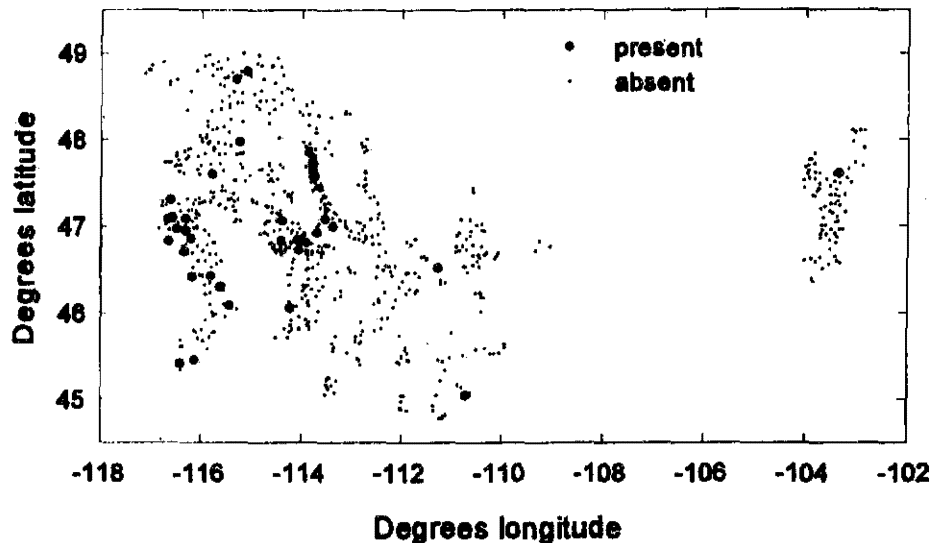
Management Considerations.

Because of their relative abundance in post-fire habitat, and their dependence on standing dead trees therein for nest sites, there is a potential negative effect of post-fire salvage cutting on this species. This is also a species that may be susceptible to cowbird parasitism in the other commonly occupied habitats--cottonwood bottomland and residential areas. We could use data on nest success under various streamside management regimes to determine whether (1) cowbird parasitism is a problem or not, and (2) whether such rates differ under different management regimes.



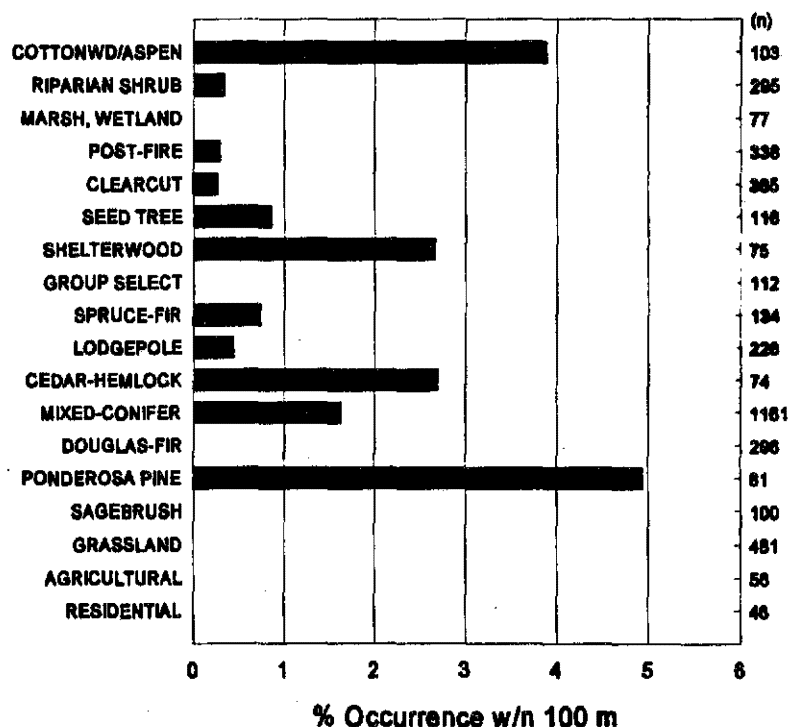
White-breasted Nuthatch

Distribution and habitat use. White-breasted Nuthatches occur across the region, but they appear to be more widespread in the western portion (see map to right). This species is most common in ponderosa pine forests and in bottomland forests with the pine element present (see histogram below).



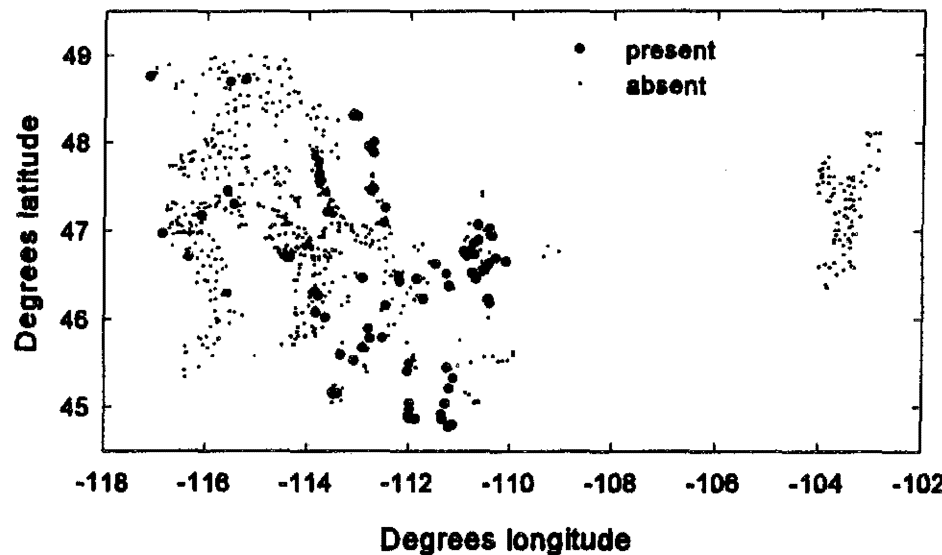
Management Considerations.

None suggested by the data, but their biology suggests that they may need relatively large trees in the areas where they occur. If so, salvage logging operations in ponderosa pine forests that target the largest trees may not be compatible with its needs.



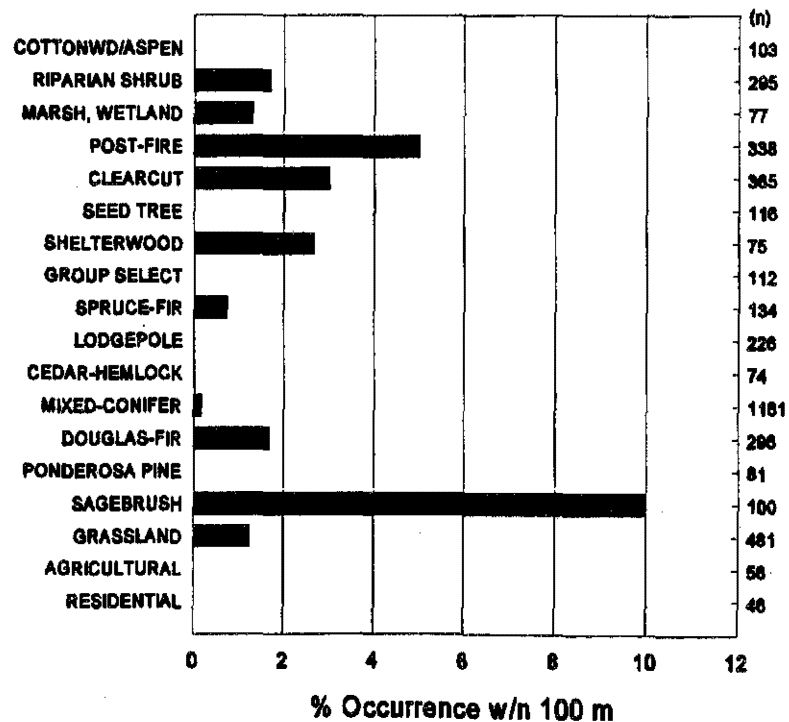
White-crowned Sparrow

Distribution and habitat use. White-crowned Sparrows are distributed primarily in the west-central portion of the region (see map to right), where they use a variety of high-elevation cover types, especially woody draws in sagebrush habitat and post-fire forests (see histogram below).



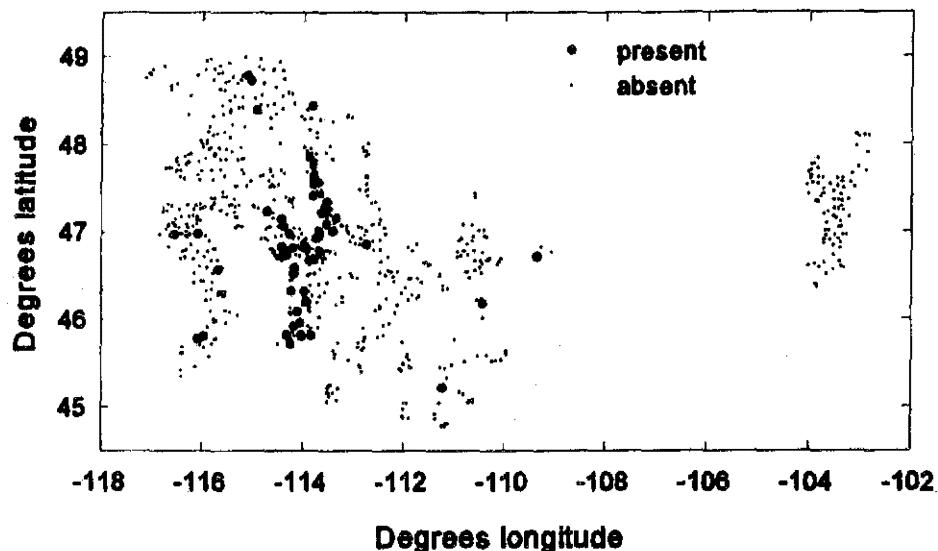
Management Considerations.

None suggested by the data.



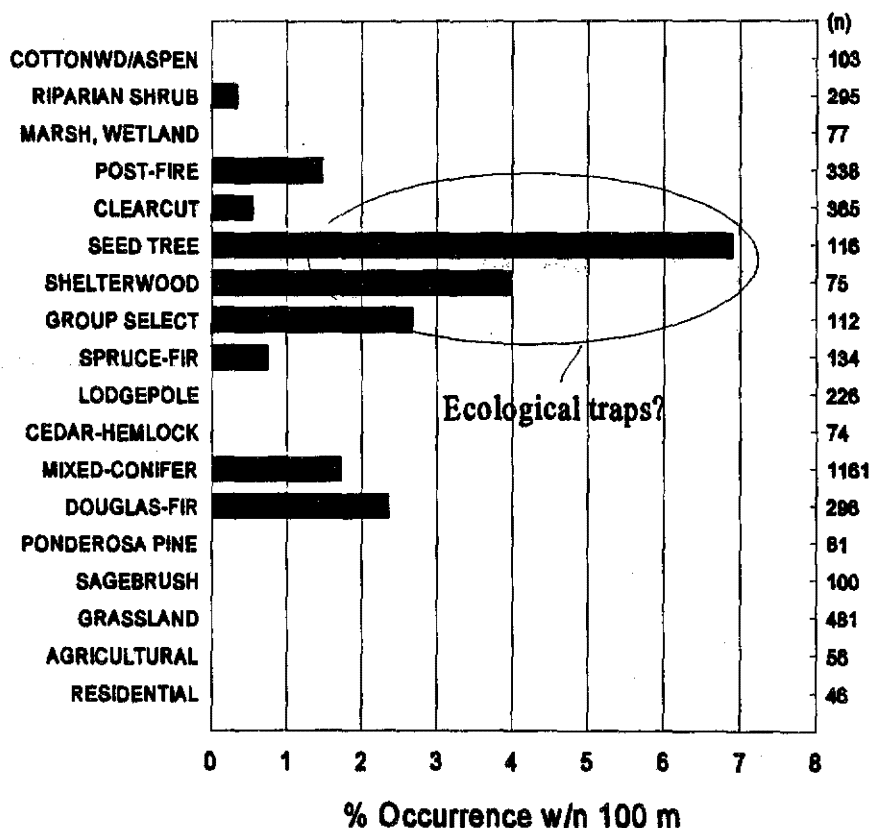
Williamson's Sapsucker

Distribution and habitat use. William's Sapsucker is restricted to the western portion of the region (see map to right), where it occurs primarily in the more heavily harvested conifer forest types that still retain some green trees (see histogram below).



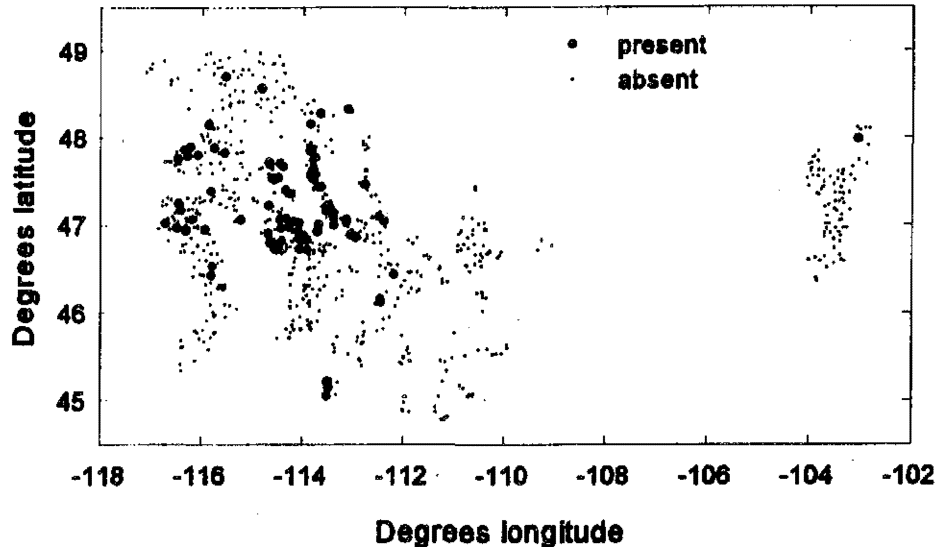
Management Considerations.

Williamson's Sapsucker provides the most graphic example of a species that is more abundant in harvested forest cover types than anywhere else. This would appear, on the surface, to be a benefit of harvesting activity, but we would need information on nesting success before we could conclude such. Because harvested forests are artificial in a number of respects, there is a chance that the proper visual stimuli exist to attract birds to settle, but that they then do poorly because other necessary requisites are not provided. In other words, there's a chance that these "unnatural" forests are acting as "ecological traps".



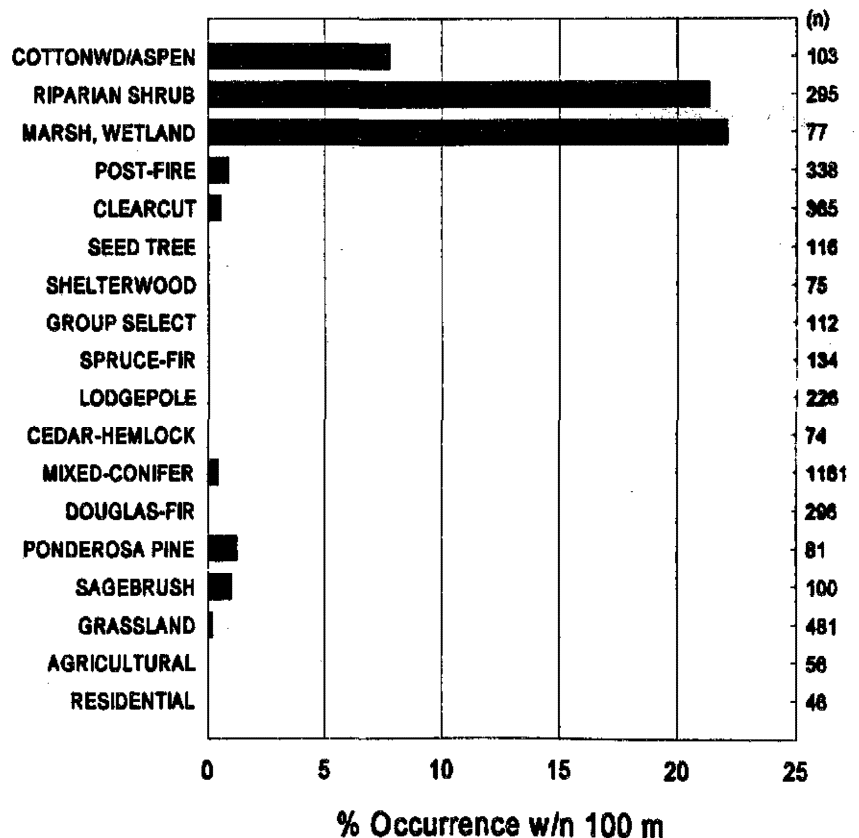
Willow Flycatcher

Distribution and habitat use. Willow Flycatchers are restricted to the western portion of the region, being replaced by Alder Flycatchers in the eastern portion (see map to right). They are strictly tied to streamside riparian areas with adequate shrub cover (see histogram below).



Management Considerations.

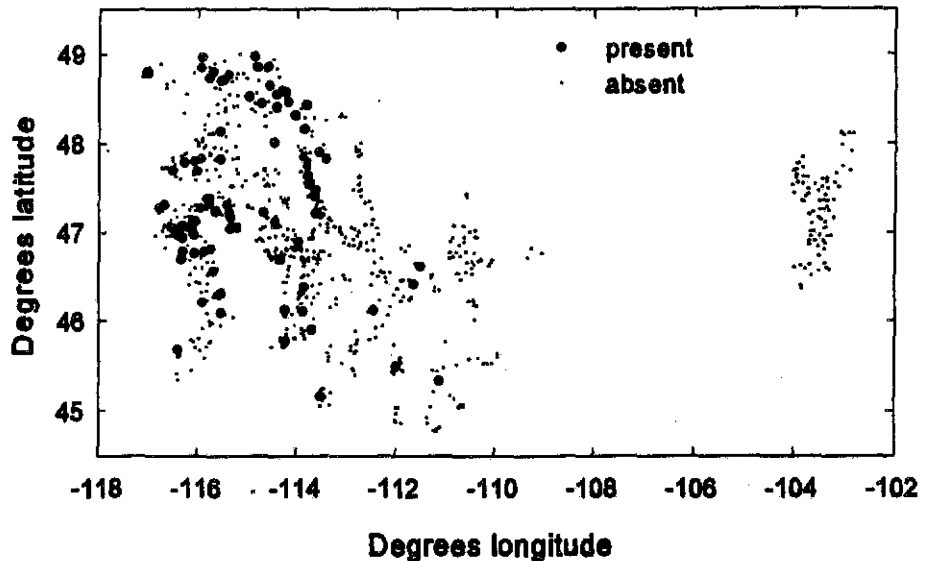
The Willow Flycatcher is one of the best examples of a species restricted to riparian areas. Because so little land area consists of this cover type, and because Willow Flycatchers occur in no other cover type, it becomes important to know whether the occurrence and nesting success of this shrub-nesting species depends on existing streamside management practices. I suspect a strong negative impact of cattle grazing because of the destruction of essential vegetation layer and because of associated increases in cowbird parasitism.



Wilson's Warbler

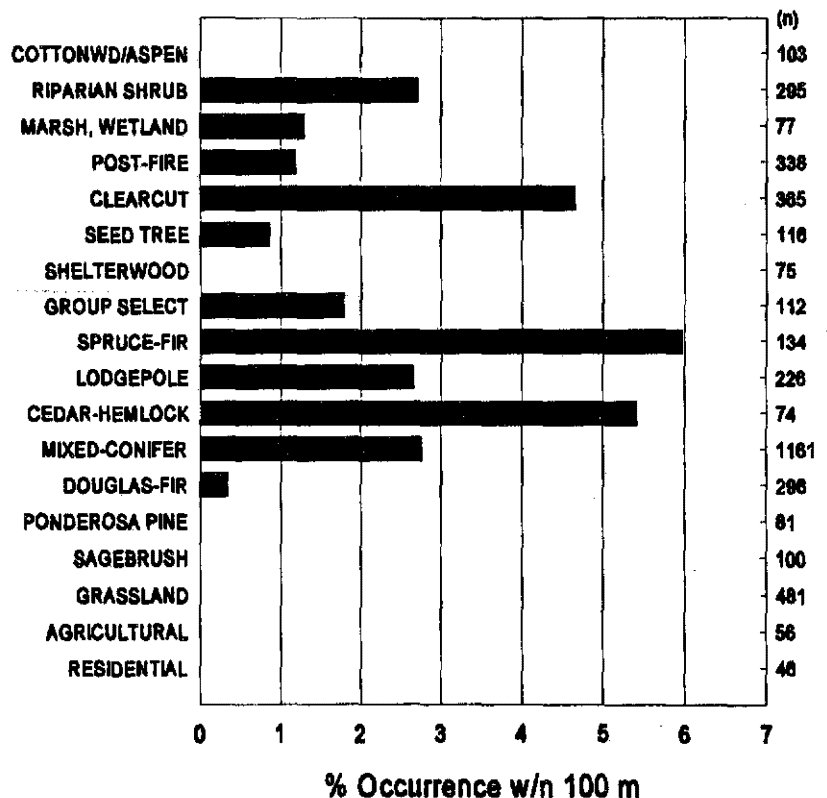
Distribution and habitat use.

Wilson's Warbler is restricted to the western portion of the region (see map to right), where it occurs primarily along streamside riparian corridors in higher elevation conifer forests. I'm puzzled by the large number of detections in the "pure" conifer forest types (see histogram below); they are not the product of catching early season migrants as they pass through unsuitable nesting habitat because I re-calculated the distribution after eliminating early season data and the picture looks the same...mis-identifications? They are 5 times more likely to occur on points with an abundance of snags, and 6 times more likely to occur on points with an abundance of dead/down.



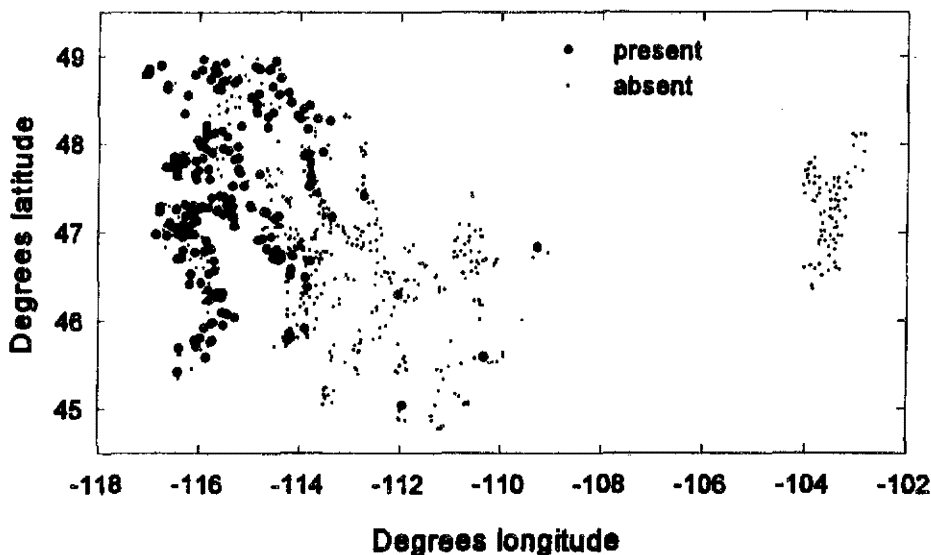
Management Considerations.

This species is probably more sensitive to streamside management practices than implied by the distribution data to the right. I believe they are relatively restricted to riparian situations and/or areas with a dense, broad-leaved understory, which means that this species might be another good indicator of whether streamside management practices are adequate to maintain suitable wildlife habitat.



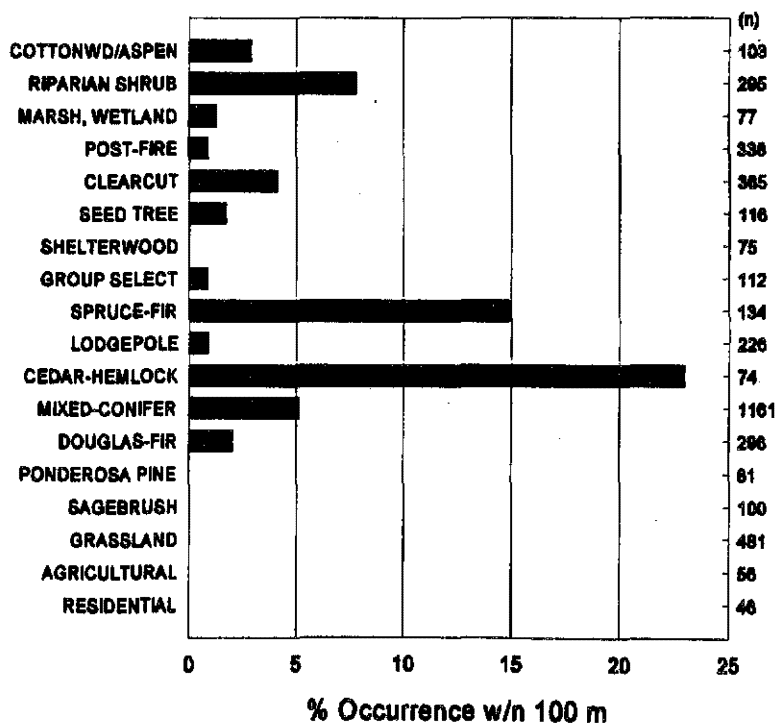
Winter Wren

Distribution and habitat use. Winter Wrens are restricted to the westernmost portion of the region (see map to right), where they are relatively restricted to uncut forest types, especially cedar-hemlock (see histogram below). Their association with streamside riparian conditions is also apparent:



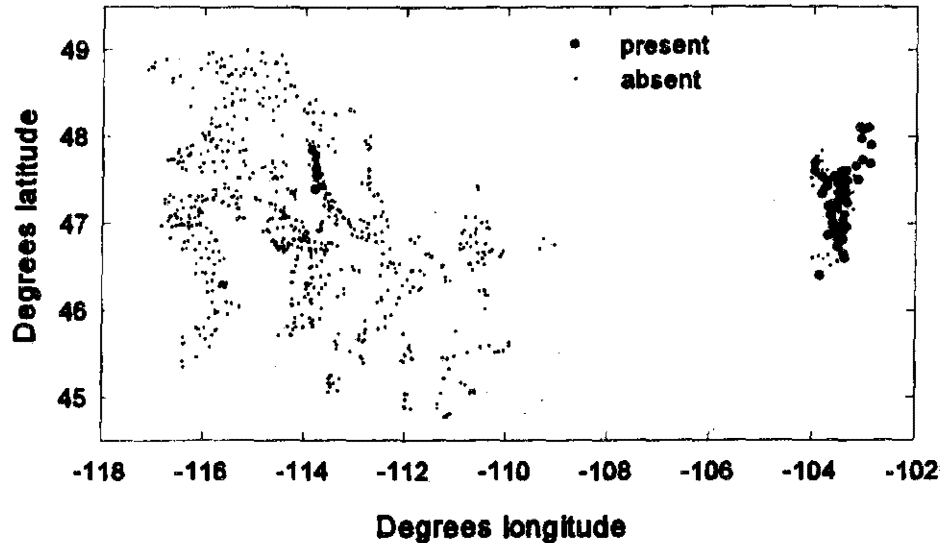
Management Considerations.

The dramatic decrease in probability of occurrence with even moderate levels of forest cutting is most striking here. The results imply that Winter Wrens need some unspecified amount of relatively old, relatively uncut forest to meet their habitat needs. Because of their strong association with streamside riparian situations, they would also serve as a good indicator of the suitability of alternative streamside management practices for wildlife populations.

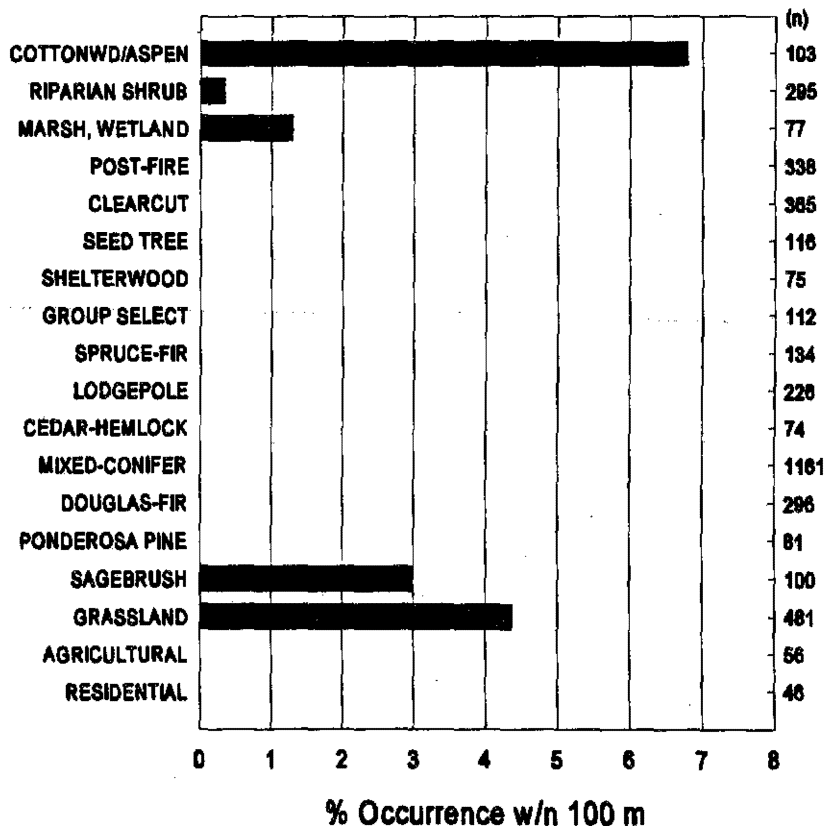


Yellow-breasted Chat

Distribution and habitat use. Yellow-breasted Chats occur throughout the region, but are much more widespread in the eastern portion (see map to right). They occur almost exclusively in low-elevation riparian bottomlands and brushy riparian draws in open grasslands and shrubsteppe (see histogram below).

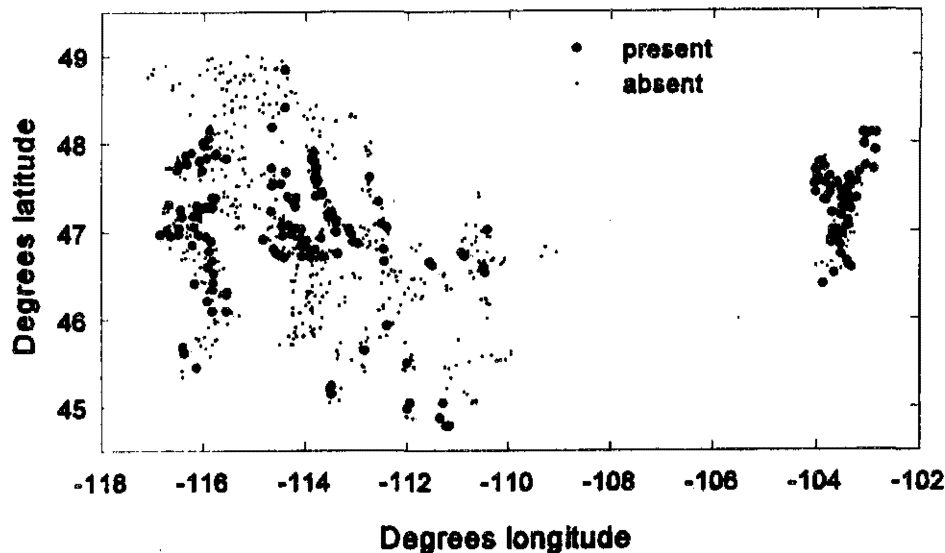


Management Considerations. Because chats are relatively restricted to riparian bottomlands, and because that cover type is so limited in areal extent, the effects of alternative management practices becomes important to consider. If conditions are made unsuitable, it has nowhere else to go. The most pressing issue is one of whether chat occurrence or nesting success (especially in the face of cowbird parasitism) is related to grazing pressure.



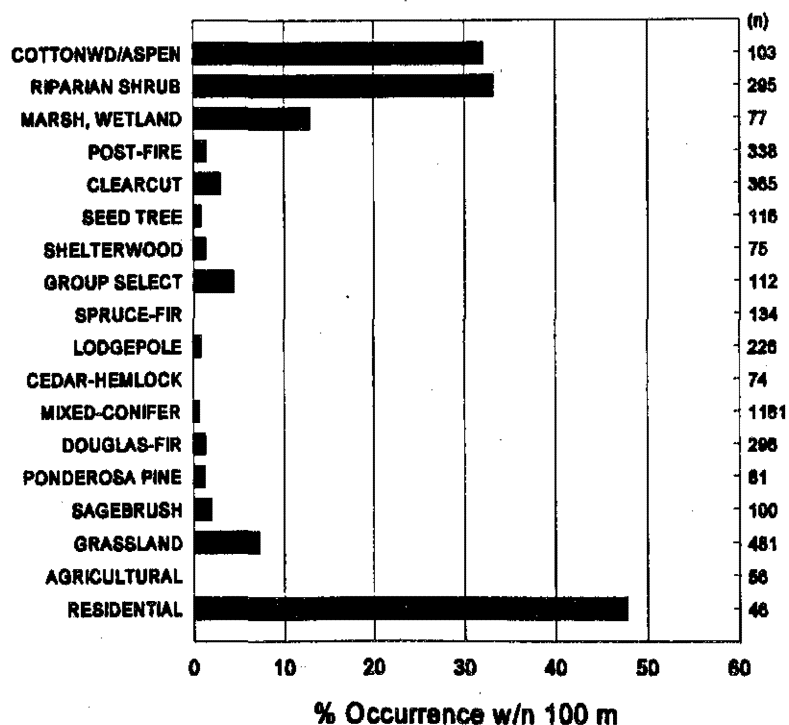
Yellow Warbler

Distribution and habitat use. Yellow Warblers occur throughout the region (see map at right). This is a riparian obligate species that is most common in riparian areas with well developed shrub layers and large deciduous trees--that includes urban areas as well as riparian bottomlands and streamside shrublands (see histogram below).



Management considerations.

Because this species is restricted to riparian cover types, and those types occupy so little land area, it becomes critical to evaluate whether the species is doing well in what little area it occupies. There may be a problem with cowbird parasitism, especially in the bottomlands, where fragmentation and cattle ranching are more common. The issue needs further study, but preliminary information may be forthcoming from the Bitterroot Ecosystem studies being conducted by a current graduate student, Josh Tewksbury.



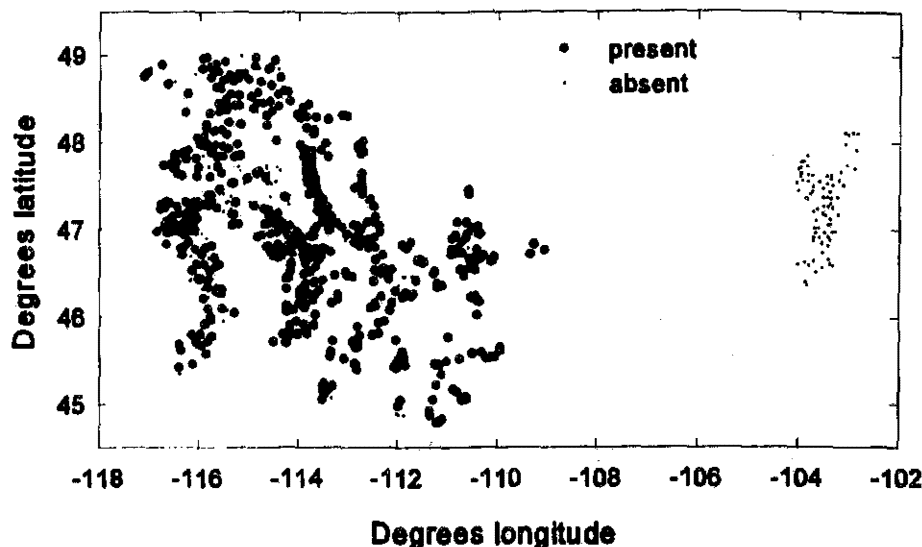
Yellow-rumped Warbler

Distribution and habitat use.

Yellow-rumped Warblers are widely distributed throughout the western part of the region (see map at right). They are most common in the more open, dry conifer forest cover types, and appear to be about as common in the variously harvested forest types as well (see histogram below).

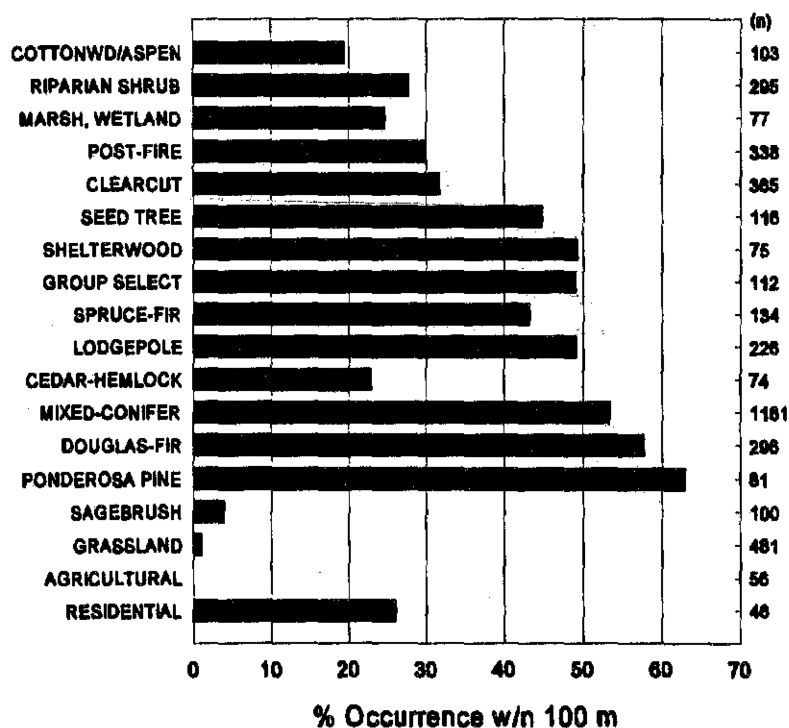
The residential occurrences result primarily from detections in rural areas.

Yellow-rumped Warblers are most common in areas with intermediate snag and dead/down densities.



Management considerations.

This species does not pose any special management concerns unless the harvested forest types, where Yellow-rumped Warblers are common, act as "ecological traps"; only nesting success studies can answer that question.



Locations of Northern Region songbird monitoring transects

